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I am submitting herewith a dissertation written by Charles Keith Stalnaker entitled "Assessing Older Worker Perceived Climate of Occupational Health and Safety: A Descriptive Study." We have examined the final 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.

Robert H. Kirk, Major Professor

We have read this dissertation
and recommend its acceptance:

Accepted for the Council:

Associate Vice Chancellor and
Dean of The Graduate School

ASSESSING OLDER WORKER PERCEIVED CLIMATE OF OCCUPATIONAL HEALTH AND SAFETY: A DESCRIPTIVE STUDY

A Dissertation
Presented for the
Doctor of Philosophy
Degree
The University of Tennessee, Knoxville

Charles Keith Stalnaker
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DEDICATION

This dissertation is dedicated

Past

to my parents, Charles D. and Sarah E. Stalnaker, who taught me the value of learning but never had the opportunity for higher education themselves

Present

to my wife, Beth, who has supported my educational efforts for 25 years

Future

to my son, Eric, who has motivated me by crossing rivers and climbing mountains that I have not known,

and

to my son, Joel, whose enjoyment of life has always inspired me.

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Others who assisted me also deserve recognition. Joseph P. Flynn, my supervisor at Lockheed Martin Energy Systems, graciously approved educational assistance funding and allowed me to alter work schedules to facilitate class attendance. Barbara Jackson's assistance with SAS® and statistics were essential to completion of this work. Lois Szluha's help with graphs and word processing advice was much needed and much appreciated.

Finally, I thank my God for strength and good health over a period of several years during which I was student, employee, husband, and father. The more I learn, the more I recognize the presence and need of a Higher Power in my life.

Abstract

The purpose of this descriptive study was to investigate differences between skilled craft workers' and other workers' (1) assessments of job characteristics related to occupational health and safety, and (2) perceptions of employer willingness to accommodate older workers with declining work capacity. This research used data collected by the Health and Retirement Study, a study of workers aged 51 to 61 years conducted by the University of Michigan for the National Institute on Aging.

Items from the Health and Retirement Study survey questionnaire were used to construct two scales: the occupational health and safety climate scale and the willingness to accommodate scale. The first scale used nine survey questions that elicited workers' assessments of the frequency they experienced job characteristics associated with a negative occupational health and safety climate (OHSC). The second scale contained six survey questions that elicited workers' perceptions of employer willingness to accommodate the needs of aging workers.

Following analysis of data with descriptive statistics, it was concluded that older skilled craft workers assessed their jobs as having characteristics (e.g., lifting heavy loads and working in awkward positions) associated with a negative health and safety climate significantly more often than workers in other job classifications. Within the skilled craft group, it was concluded there was no significant difference between younger old (aged 51-55 years) and older old (aged 57-61 years) worker assessments of OHSC; there was a significant difference between male and females, with females assessing their jobs as

having a significantly higher frequency of characteristics (including less freedom to decide how do their work and a high degree of repetitiveness) associated with a negative OHSC; there was no significant difference in the assessments of OHSC between Blacks and Caucasians or between Blacks and Latinos, but there was a significant difference between Caucasians and Latinos, with Latinos assessing their jobs as having a higher frequency of characteristics associated with a negative OHSC; and there was no significant difference in assessment of OHSC between union and non-union members. It was concluded that there was no significant difference in how skilled craft and other workers perceived the willingness of their employers to accommodate the needs of older employees.

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CHAPTER I

INTRODUCTION

Prior to the industrial age, most products were built in small master-owned shops by highly skilled workers. Many businesses were family operated with limited employment of others. With the introduction of technology, more labor was needed to perform defined tasks, leading to a hierarchy of supervisors and managers to oversee the performance of work. The personal relationships that existed between master craftsmen and their few workers were replaced with more formal employee-employer contracts or agreements. As more production capacity was needed, larger work places were constructed without understanding of general worker health and safety needs (Grimaldi & Simonds, 1989).

Beginning with child labor legislation in 19th century England, industrial nations passed occupational health and safety legislation to protect workers. English mine accidents and factory conditions resulted in some of the earliest industrial codes for regulating dangers to worker health and safety. In the 1870s, following the lead of Great Britain, Massachusetts became the first state to establish health and safety regulations. Almost a century later, Congress enacted the Occupational Safety and Health Act (OSHA) of 1970. OSHA quickly became the most important safety legislation in United States history.

Although there are numerous federal and state regulations, health and safety of the American worker is not assured. Older workers are one group with special health and safety needs. As a result of chronic and acute effects of aging, older workers have

increased susceptibility to certain hazards and working conditions. Despite being vulnerable, few government regulations and corporate health and safety programs acknowledge the impact of declining physical work capacity on older workers.

The number of older workers in the work force is expected to increase significantly in the 21st century. The increasing age of Social Security eligibility, the aging of the baby boom generation, and the decreased availability of younger workers are some of the reasons the work force will age. Having larger numbers of older workers in jobs traditionally held by younger workers raises questions about existing health and safety programs. Can older workers perform physically demanding job tasks without jeopardizing their health and safety? Will American businesses accommodate the needs of older workers with declining physical work capacity? Will something other than "one size fits all" occupational health and safety policies, procedures, and regulations be required?

The Health and Retirement Study (HRS) was funded by the National Institute on Aging with a Congressional appropriation. The HRS provided researchers data on the retirement decision and health issues of older workers. The study collected pre-retirement data using a national area probability sample of United States households concentrating on economic, health, and other factors important to the older worker (Juster & Suzman, 1995).

Statement of the Problem

The problem in this study was to study differences in perceptions of elements of occupational health and safety climate between older workers in different job

classifications. The purpose of the study was to evaluate differences between skilled craft workers' and other workers' (1) assessments of job characteristics important to occupational health and safety, and (2) perceptions of employer willingness to accommodate older employees with declining work capacity.

The purpose was addressed by the following research questions:

1. How do skilled craft workers assess the health and safety of their work places as compared to workers in other job classifications?
2. How do skilled craft workers in the following subgroups assess the health and safety of their work places:
    a. older (57-61 years) and less old (51-55 years),
    b. male and female,
    c. Black, Caucasian, and Latino, and
    d. union members and non-union members?
3. How do skilled craft workers perceive their employers' willingness to accommodate older employees as compared to workers in other job classifications?

Need for Research

Considerable research (e.g., Eastman, 1996; Hurd & McGarry, 1993; World Health Organization, 1993) has been conducted that demonstrates the negative relationship between job stress and work place health and safety performance. Older workers and managers who report low job satisfaction are more favorably inclined to retirement than

those in jobs with higher levels of contentment (Cordes & Dougherty, 1993; Harris, 1991; London & Greller, 1991) and work place safety climate is considered an important factor of job satisfaction (Carey, 1993; Organization for Economic Co-operation and Development, OEDC, 1995a).

Surveyed members of the American Society of Safety Engineers rated the need for research on the impact of the aging work force on occupational health and safety as the highest of 27 research topics (Thomas & McDonald, 1994). The researchers who conducted the survey concluded that safety research has not given adequate attention to health and safety issues associated with older workers.

Demographics of the American work place are changing. The American workforce is aging. Between 1970 and 2000, the median age is projected to increase from 28 to 40 years, with further increases forecasted in coming decades. Educational requirements are projected to increase (Gilsdorf, 1992), bringing about a need to retain educated workers in critical job classifications such as skilled crafts (International Labor Organization, 1995).

To protect worker health and safety, the American work place needs policies, procedures, and practices that accommodate the needs of older workers. There will be larger numbers of workers with decreased physical work capacity in the 21st century. Without accommodation, many of these workers will exhibit the results of stress caused by work demands that exceed their capacity. Few businesses recognize the effects of stress on older workers and that it results in decreased participation in the work force (Gustman & Steinmeier, 1986; Hurd & McGarry, 1993; Ringenback & Jacobs, 1995a).

Job-related stress occurs when physical work demands exceed an employee's physical capacity to perform assigned work (Ilmarinen et al., 1991). The physical limits of young workers with excess physical capacity are rarely challenged. However, as an employee grows older, the natural effects of aging deteriorate physical capacity, and there is increasing opportunity for job demands to approach or exceed the capacity that remains (World Health Organization, 1993). When work demands exceed capacity, stress develops, mental mistakes occur, and the risk of occupational injury and illness increases.

Compared to younger workers, statistics of older worker occupational health and safety performance show an elevated fatality rate. When older workers are injured, they are likely to suffer more severe consequences and require longer recovery periods than their younger counterparts (United States Bureau of Labor Statistics, USBLS, 1995b).

A major benefit of this research is to understand better the perceptions of occupational health and safety among older skilled craft workers. Understanding these perceptions is one way to identify occupational factors that are barriers to continued productive employment of older people.

Occupational health and safety was selected for research because it is impacted by management, supervision, and the worker. Zohar (1980) found that worker perceptions of management's interest in safety have a strong impact on an organization's safety climate. Safety climate reflects actions by management including funding decisions, work place design, job descriptions, and willingness to accommodate workers. It also reflects actions by supervisors who make job assignments, decide work rest practices, and set the tone for compliance with health and safety rules. The worker also affects the safety climate by

watching out for the safety of co-workers, complying with rules, and not taking chances.

Basic Assumptions

The following assumption was professed: The responses of workers to Health and Retirement Study questionnaire items were honest and accurately represented their assessments and perceptions of the work place.

Delimitations

The following delimitation was applied by the researcher: The study was delimited to data collected from full-time workers who participated in the Health and Retirement Study.

Limitations

The study contained the following limitation: Each subject may not have been exposed to the same elements of safety climate prior to participating in the Health and Retirement Study.

Definitions of Terms

Definitions of occupational health and safety terms important to this research:

Job Characteristic - environmental conditions and work activities to which an employee is exposed (Grimaldi & Simonds, 1989).

Occupational Health and Safety Climate - interpretation of work place health and safety environment by its workers (Planek, 1994).

Older Worker - a person aged 51 years and older that is employed in an occupation (Health and Retirement Study, 1995).

Skilled Craft Worker - a person employed in one of the following U.S. Census Code labor categories: mechanics and repair, Codes 503-549; construction trade and extractors, Codes 553-617; precision production, Codes 633-699; and machine operators, Codes 703-799 (Health and Retirement Study, 1995).

Work Capacity - a comprehensive term covering the physical, mental, and social functions that define the ability of an individual to cope with everyday work activities (World Health Organization, 1993).

Summary

The purpose of this study was to evaluate differences between skilled craft worker and other worker (1) assessments of job characteristics important to occupational health and safety, and (2) perceptions of employer willingness to accommodate older employees with declining work capacity. The need for the investigation was supported by a review of literature and research that concluded there are unresolved safety and health issues associated with the aging work force (Thomas & McDonald, 1994; Harris, 1991; "Ageing at Work," 1993). In the 21st century, multiple factors will increase both the demand for and the number of older workers in certain critical skill areas, resulting in a need to better appreciate older worker health and safety. Understanding the antecedents of occupational

health and safety climate may help identify changes needed to make the American work place more accommodating of its older workers.

CHAPTER II

REVIEW OF THE LITERATURE

Three general reasons have been proposed to explain the withdrawal of workers from the work place before the traditional retirement age of 62 to 65 years: personal factors, including poor personal and family health; external factors such as limited pension or other retirement income; and job circumstances that add to the attractiveness of retirement. Research has been conducted on the impact of personal health, government incentives, personal financial status, and job satisfaction on the retirement decision.

The literature and research reviewed in this chapter were selected based on the following: theoretical framework, literature and research related in content, literature and research related in methodology, and literature and research related in content and methodology. Materials applicable to the retirement decision, particularly those concerning predictors of retirement, physical work capacity, safety climate, and worker perceptions of health and safety, were emphasized.

Theoretical Framework

The study of occupational health and safety requires an understanding of safety behavior theory. The theoretical framework for this research was supported by two models.

Israel and Schurman's (1990) stress process model stated that an individual's perception of stress is the result of, and contributes to, stresses and changes in several systems, including the work place. The model's development includes contributions by several disciplines, namely physiology, social psychology, and epidemiology.

The stress process model explains stress as an imbalance between environmental demands and individual ability to cope with those demands. In the work place, work demands and conditions can cause negative physiological, psychological, and behavioral changes. Although a moderate level of stress has been shown to be beneficial to workers when it creates a challenge that can be solved with reasonable effort, excessive stress frequently has the opposite effect. One example is the stress that results when heavy demands on the musculoskeletal system exceed a worker's physical abilities. A worker may deal with repeated episodes of excess stress in one or more ways, including adjusting characteristics of the job, changing jobs, retiring, or when other alternatives are not available, suffering physically and mentally as stress accumulates.

The stress-strain model, developed by Finnish researchers (Ilmarinen et al., 1991), combined work stress factors with individual factors resulting in physical and mental strain. The stress-strain model emphasizes that stress can be created by both ends of the work demand scale and is highly influenced by individual perceptions, level of knowledge, and training. When work demands exceed worker capacity, overstrain is induced. When work demands do not challenge the worker, understrain or boredom is induced. Both extremes produce undesirable stress.

Research and Literature Related in Content

Research and literature reported a number of efforts to establish, improve, and study elements of occupational health and safety. As related to older workers, some of the most important of these were studies of job characteristics, predictors of retirement, health and safety statistics, work capacity, and interventions.

Background

At the turn of the 20th Century, people worked almost to the end of life. Approximately 67 percent of males in the United States over age 65 years were working in 1900 (Talmon, 1968). As the decades passed, Social Security and employer pensions supplied retirement income for many Americans, and people began retiring at earlier ages.

After the troops returned from World War II, approximately 76 million births were recorded between 1946 and 1964. The "baby boom" generation was the largest, and subsequently the most educated, in the history of the United States. Beginning in the 1970s, retirement incentives were used to lure older workers out of the work place to make room for the leading edge of the boomer generation. When the 1990s brought the challenges of a world economy and the demand for corporate downsizing, incentives enjoyed renewed popularity as a way to move older workers into retirement. These and other stratagem have resulted in large numbers of workers under age 62 leaving work for early retirement.

With current efforts to reduce corporate payrolls, some may ask why there is a need to find ways to keep older Americans out of retirement. The answer to this question requires a look into the 21st century when there is projected to be too few qualified young

workers to fill certain vacancies created by retiring boomers. In the late 1980s, the United States Senate Special Committee on Aging predicted the baby bust of the preceding 30 years would result in a national shortage of younger workers in critical job categories, and that there would be an increased need to find labor supplies in the ranks of the middle and older work force (McLean, 1988) early in the next century. Supporting this prediction, the tool and die industry has reported its approximately 24,000 unfilled skilled jobs were jeopardizing the United States' ability to remain a world leader in this high technology field (Graves, 1997). Despite the rapidly approaching need, the American Association of Retired Persons and the Society for Human Resource Management (1993) found that 72 percent of surveyed businesses did not have practices in place that encouraged older workers to remain on the job.

Concurrent with the trend of early retirement, the American family was shrinking. The post-World War II baby boom was followed by sharply declining birth rates beginning in the 1960s and continuing today. As fewer people entered adulthood, the work place began losing workers in younger age categories. By the year 2000, the 16-to-24 age group will decline by over one million workers, creating a shortage of qualified workers in some critical skill areas as this "bubble" passes through the 21st Century. The result of reducing birth rates is expected to create shortages in the work force for decades to come (Allerton, 1994).

A benefit of the 20th Century has been extended life expectancy. In 1900, the average person lived 47 years. As the century nears a close, life expectancy is nearly 76 years and is expected to increase further (Kirkland, 1992). The results of longer life, the

baby boom generation, and fewer births are an aging population and an aging work force. By the year 2000, the number of people 45 and older will have increased over 37 percent from the 1980 level (Philson, 1990). By the year 2030, Americans age 65 years and older will more than double and a third of the population will be 55 and older, while the number of Americans under age 55 will increase by only one percent (Organization for Economic Co-operation and Development, 1995b).

In 1970, the median age of employees was 28. In 2000 the median age is projected to increase to about 40, with future increases expected ("The Rising Tide of Older Workers," 1992). Changes in family patterns and job situations are keeping people in the work force longer. Single parent families, double income households where childbearing is delayed, and increasing costs of post-secondary education are some reasons for delayed retirement. Many retirees from small companies where most job growth is occurring will have limited or no pension benefits. Eligibility for full Social Security benefits will gradually increase to age 67 by the year 2027 and it is expected that companies with pension plans will redesign them around the new retirement age.

Some defend the trend of early retirement by suggesting it provides an avenue of opportunity for younger workers that would otherwise be delayed. However, replacing older workers with younger ones has not always been successful. Experiences in Europe, most notably in Belgium, France, Spain, and the United Kingdom show that many jobs vacated by older workers disappear because of lack of experience and knowledge of new entrants in the labor force (International Labor Organization, 1995). In the United States, jobs required a median age of 12.5 years of education in 1975. By 2000, the median will

increase to 13.5 years (Gilsdorf, 1992). The problems created by a lack of qualified young replacements are expected to become critical in certain skilled occupations.

Between 1975 and 1990, the overall labor force participation increased by 5.2 percentage points. Between 1990 and 2005, the increase is projected to drop by 2.6 percentage points. After 2005, as the baby boom generation moves to ages older than the average worker, the labor force participation is expected to be steady or to drop (United States Department of Labor, USDL, 1992).

Future demand for workers involves two factors. First, jobs are created by growth in occupational employment. These are "new jobs". A second consideration is the need to replace workers who leave occupations to either start new careers or to retire. According to the USBLS (1996), more job openings through 2005 will result from net replacement needs (29.4 million) than from growth in the economy (17.7 million). In the "precision production, craft and repair" category, 4.8 million job openings are projected to be due to replacements while only 2.1 million will be due to growth.

Through the year 2005, service-producing industries will account for most new jobs (USBLS, 1996). Although the goods-producing sector is expected to experience an overall decline, construction labor is expected to increase. Skilled craft workers are found in various industries, and construction and manufacturing are two of the largest employers. Construction workers include carpenters, electricians, plumbers and pipefitters, and sheetmetal workers. Employment in industrial and heavy construction, where skilled craft labor is extensive, is projected to grow faster than the industry average, especially in highway and industrial plant construction. Bridge construction is expected to grow fastest

and poor highway conditions are forecast to result in increased demand for highway maintenance and repair. A shortage of skilled electricians is forecast for the next decade because of the small number of young workers entering training programs (USBLS, 1996).

Manufacturing employs crafts such as millwrights, boilermakers, machinery operators, tool and die makers, welders, and machinists. Although there is expected to be a decline in employment in this sector through 2005, the USBLS (1996) projects a demand for workers including machinists and tool and die makers because of the difficulty employers are having in attracting new or young replacement workers to these occupations. Toolmaker apprenticeships that were once common in large industrial companies are now rare (Graves, 1997).

The use of older workers is expected to develop into a major labor force issue during the next century. By the year 2000, the percentage of the workers between the ages of 35 and 54 will increase to 51 percent and workers over 55 will increase to approximately 12 percent of the work force ("The Rising Tide of Older Workers," 1992).

In contrast to the expected needs of the 21st century, the proportion of working older men has declined in all 25 countries in the OECD (1995b) over the past 35 years, resulting in little research on older workers (Kotulak, 1990). Between 1970 and 1992, the work force participation of U. S. males between the ages of 60 and 64 years declined by over 24 percent, from 73 to 55 percent. These workers not only ceased to make an economic contribution, they also started receiving early retirement benefits, creating a burden on the Social Security system (Stalker, 1995). The OECD described the situation as a paradox: there is concern about whether there will be enough working age people to

support the growing proportion of the population above the retirement age, while at the same time a growing proportion of the population below the standard retirement age is leaving the work force. This condition presents serious implications for financing the burden of early retirement in the future.

In addition to providing needed skills, older workers bring other benefits to the work place, including flexibility in scheduling, low absenteeism, high motivation, loyalty, and mentoring abilities. Even with these benefits, most companies underutilize and undervalue older workers. Over 65 percent of surveyed companies did not believe there was a need to encourage older workers to remain on the job (American Association of Retired Persons and Society for Human Resource Management, 1993).

Not all prospective retirees want full-time retirement. Even with the relatively recent trend toward early retirement, between one-third and one-half of today's retirees have indicated a preference to work, usually on a part-time basis (Morrison, 1988). This desire provides hope of increasing the work force participation rate of older people in the 21st century.

Although some evidence suggests older workers are able to work in jobs with physically demanding characteristics, there is also an indication workers are avoiding such jobs. In the metal trades, the percentage of retirement-age men physically capable of staying on their jobs was estimated at 45-55 percent in the 1950s (Clark & Dunne, 1956), a period when physical job demands were much greater than today. However, the World Health Organization (WHO, 1993) reported that workers over age 45 move away from jobs that require heavy manual labor, demand continuous body movement, and involve

time pressure. These attributes describe many jobs in the construction industry that require prolonged standing, bending, stooping, and working in cramped quarters, in addition to exposure to weather and potentially dangerous equipment (USDL, 1992). WHO (1993) research suggested that many traditional hourly jobs will not appeal to older workers without some redesign, adjustment, or accommodation.

Stereotyping of older workers has damaged both the stereotyped and the stereotyper. When management establishes a climate that treats older workers as being "over the hill", they may respond accordingly by ceasing to be productive (Hale, 1990). Unchecked, such attitudes can lead to a loss of valuable resources of maturity and talent as older workers ease into early retirement as the "expected" thing to do.

Predictors of Retirement

Research conducted using data from the Health and Retirement Study found that chronic health conditions prevalent in a large segment of the older working population are more important than acute conditions in early retirements (Dwyer, 1996). In a review of reasons for retirement, Parnes (1988) concluded complex economic and noneconomic reasons predict retirement, including earnings, assets, health, attitude toward work, and job satisfaction. Eastman (1996) found that early retirees who leave one job for another do so because of burnout and dissatisfaction with the job being left.

Other research (Sherman, 1985) identified the desire to retire and the loss of a job as important influences. Higher income per capita and increased urbanization have also been cited as contributing factors (Clark & Anker, 1993). For occupations with high substantive complexity, the presence of unions has been found to increase the likelihood

of early retirement, suggesting that unions are generally more responsive to pressures for higher wages from younger workers than protecting labor force opportunities for older workers (Hayward & Hardy, 1985).

Research on attitudes toward retirement among older executives found that those who reported high job tension, low job satisfaction, and low effectiveness were most favorably inclined toward retirement (Eden & Jacobson, 1976). Job-related stress leading to burnout has been reported to be responsible for increased turnover in workers of all ages (Cordes & Dougherty, 1993).

Others hypothesize that many retirement-eligible workers are not satisfied with the existing terms and conditions of their employment, but would consider continuing under different circumstances (OECD, 1995b). In a study of displaced workers, safety was identified as the strongest predictor of job satisfaction in a worker's new employment, ranking higher than benefits and management relations (Carey, 1993). In a study of 334 occupations, Filer and Petri (1988) found a significant relationship between physical and emotional job strain and retirement age. Job characteristics such a repetitive work, heavy physical demands, and stress were associated with early retirement. These researchers also found that self-employed workers retired at later ages, suggesting that the flexibility to adjust the work environment to meet personal needs may be a factor in delaying retirement.

Morrison (1988) identified a need for changes in personnel policies to allow flexible scheduling and part-time work for older workers. Occupational social workers Mor-Barak and Tynan (1993) suggested job-sharing, phased retirement, rehiring retirees part-time, job

redesign, job transfer, and job retraining as influences that might affect the retirement decision.

Noting a lack of planning directed at the later stages of life, a Lancet editorial identified the need for study of the ability of workers in their 60s and 70s to cope with work ("Ageing at Work," 1993). Harris (1991) suggested there is need for study of the relationship between growing discomfort and job safety concerns with exits from the work place. Surveyed safety practitioners rated the need to evaluate the impact of the aging work force on occupational safety and health as the most important of 27 research topics, suggesting that inadequate research attention has been given to health and safety issues associated with older workers (Thomas & McDonald, 1994).

A report by the International Labor Organization (1995) called for eliminating the occupational health and safety hazards that hasten employee aging and reduce the working capacity of older workers. The International Labor Organization recommended a combination approach including health promotion, job redesign, training and improved working conditions, adapted to the needs of older workers. Safety researchers in the United States (Ringenback & Jacobs, 1995a) reported that when work requirements exceeded the capabilities of a worker of any age, the risk of injury increased. Older workers who exhibit declining physical work capacity have increased risk of injury in job situations where demands remain constant over time (WHO, 1993), typical in many industrial shops and construction sites. This risk increases when workers are in inflexible jobs where management is either limited or unwilling to make preferential job assignments, and when management or union representation is not knowledgeable of the potential for work

demands to overcome the physical capacity of aging workers.

A study by Hurd and McGarry (1993) concluded that workers delay retirement when they can reduce hours of work or move to a less demanding job. The researchers postulated that job characteristics are neither good nor bad, but that workers move to jobs with characteristics that suit them and their needs. Hurd and McGarry's findings are consistent with the research results of Gustman and Steinmeier (1986) who found a decrease in the participation of workers in physically demanding jobs as age increases. These results suggest that workers avoid physically stressful jobs as their physical capacity declines. When workers have the flexibility to work fewer hours or move to jobs that accommodate their declining work capacity, they appear to compensate for reduced physical work capacity by being more aware of job safety (Ringenbach & Jacobs, 1995a) and are less likely to experience job-induced health and safety problems. Unfortunately, as the percentage of older workers increases, such flexibility may be less available.

In summary, occupational safety and health factors such as physical strain, stress, repetitive work, and working conditions are factors that contribute to a worker's overall job satisfaction. Research (Parnes, 1988; Filer & Petri, 1988; OECD, 1995a; et al) has shown that safety and health factors cause some workers to leave the work place prematurely. The need for business to abate negative health and safety factors is consistent with the stress model which suggests that some older workers need work place accommodation to compensate for age-related declines in physical work capacity. Without accommodation, work demands can exceed the capabilities of the worker, exposing him/her to danger on the job.

Health and Safety Statistics for Older Workers

Statistics concerning the adequacy of occupational health and safety programs to protect older workers are not encouraging. Although injured less frequently than their younger peers, older workers require significantly longer recovery periods and suffer job-related fatalities at a significantly higher rate.

Unintentional deaths have been a major cause of death in the United States for people of all ages. Nationally, the number of 1993 deaths from job-related incidents totaled 6,271 (Toscano & Windau, 1994). With a death rate of 15 per 100,000 employed, workers age 55 years and older died as a result of their jobs at a rate three times that of their younger co-workers.

Government and industrial statistics have not incorporated illness-related deaths because of the latency period of most occupational illnesses and the difficulty in linking these illnesses to work place exposures. If included, job-related illnesses due to chronic exposures could significantly increase the death rate of older workers.

Of the events causing death to older workers, on-the-job highway motor vehicle accidents top the list (18 percent), followed by job-site homicide (13 percent), and farm/industrial incidents (12 percent). Vehicles, including personal and employer motor vehicles, industrial forklifts, farm tractors, etc., are the source of injury in over 40 percent of older worker fatalities.

For less serious events, the most frequent disabling condition experienced by older workers is sprain or strain (37 percent of cases), followed by fractures (11 percent), and bruises or contusions (11 percent). Corresponding to these injuries, the most frequent

disabling events are falls (25 percent), overexertion (23 percent), and being struck by an object (11 percent) (U.S. Bureau of Labor Statistics, 1995b).

In non-fatal injuries, older workers take longer to recover because their injuries tend to be affected by the aging process. Chronic conditions such as arthritis, hypertension, and hearing loss impair the recovery ability of older workers (Harris, 1991).

Work Capacity of Older Workers

"Work capacity" is a conceptual term used to cover all the capacities needed to perform work: physical, mental and social. When an individual's work capacity is exceeded by work demands there is an opportunity for job-related stress and occupational injury and illness (WHO, 1993). As a person ages, there is increased opportunity for physical work demands to exceed physical work capacity.

Studies of skilled workers showed an inverted U-shaped performance curve in which performance peaked in the late 30s and early 40s, with a gradual decline in performance in the 50s and 60s. The WHO encouraged business to make adjustments to the work place for changes in physical work capacity (vision, hearing, and muscle strength) that occur with aging. Many job factors influence work capacity and health and safety of the worker at work and off the job. Studies showed that workers assigned to night shift have increased risks of vehicular and performance errors (two primary causes of occupational injury), gastric disorders and heart disease (Budnick, Lerman, Baker, Jones, & Czeisler, 1994), and undesirable eating habits and sleeping patterns (Phillips & Brown, 1992).

In a study of the American highway system, Younes (1994) concluded highways are not designed for the diminished capabilities prevalent in a large segment of the older population and that accommodation is needed to address these limitations. Lusa (1994) found that detection of reduced work capacity, particularly for older and unfit workers, is needed to establish a safe work environment.

Interventions

When workers have flexibility to control their work activities, they appear to compensate for reduced physical work capacity by being more aware of job safety (Ringenbach & Jacobs, 1995a). The flexibility to adjust work may be one technique for improving job satisfaction of older workers. However, selective work challenges the basis of many traditional labor agreements and management policies, and such flexibility could lead to the disproportionate assignment of physically demanding work to younger co-workers who will make up a smaller proportion of the work force of tomorrow. There is also evidence that engineering solutions are an effective way to accommodate declining work capacity. One facility redesigned its work place with adjustable work stations and not only reduced back injuries by over 50 percent, but also boosted productivity and employee morale. Further, back injuries that occurred were less severe and less expensive following the engineering modifications (LaBar, 1992). In a study of drivers over the age of 65, interventions with costs as low as $5-$20 per senior were effective in providing a 7.9 percent improvement in driving performance (Ashman, Bishu, Foster, & McCoy, 1994).

A building supply company shifted restocking and associated heavy lifting to the night shift, allowing older day shift employees to concentrate on sales duties (Mor-Barak & Tynan, 1993). Although effective at protecting older worker health and safety, only one in 100 U.S. corporations offers comprehensive job modification programs (Ramirez, 1988).

Changing Nature of Work

Gradual changes in the work place are improving conditions for some senior workers. In industrial occupations, improvements and enhancements resulting from the introduction of technology have reduced physical demands. Also, from the mid-1980s to the mid-1990s, approximately nine in ten new jobs have been in the service sector (Goldstein & Gilliam, 1990) where physical demands are typically less demanding than those in manufacturing or construction.

Although their 21st Century ranks will probably not grow at the rate of the past 50 years, skilled craft workers are expected to remain in demand. Predicted labor shortages and a declining skill level of younger workers are likely to create a strong demand for available skilled workers, especially in the defense, energy, and construction market segments (American Association of Retired Persons and the Society for Human Resource Management, 1993).

Occupational Health and Safety Climate

Occupational health and safety climate ("safety climate") has been defined as the assembly of characteristics and attitudes in organizations and individuals which establishes that, as an overriding priority, safety issues receive the attention warranted by their

significance. Safety climate refers to the personal dedication and accountability of all individuals engaged in any activity that has a bearing on safety (International Atomic Energy Agency, 1991).

Planek (1994) contended the safety climate of a company exists at two levels. First are underlying values and beliefs shared by organization members. Second, and more visible, are behaviors that management encourages employees to follow. Management's conviction of the need to accommodate older workers, followed by demonstration of that conviction, will be needed to create a safety climate conducive to older workers. Supervisors play a significant role in establishing a company's safety culture. Even where formal safety policies and safety programs have been devised by management, the failure to prepare supervisors and hold them accountable for implementation have limited effectiveness. It has been reported that writing safety policies and safety rules are only the initial steps of establishing an effective safety program. Where poor housekeeping, hazardous conditions, and failure to use personal protective equipment are tolerated by supervision, accident rates increase regardless of the formality of the safety program (Mattila, Hyttinen, & Rantanen, 1993). Manuele (1997) indicated that employees observe what management does, rather than what it says, when interpreting what hazards-related incidents are tolerable.

Efforts to accommodate seniors in the work place will require an initial understanding by management that older workers are needed, followed by the establishment of policies, procedures, and practices conducive to their retention. Full accommodation will not occur until management recognizes that seniors have skills and

talents that must be tapped for the business to be successful.

One "accommodation program" will not meet the needs of all older workers. Research of employees in two highly similar divisions of the same company found that each division viewed the safety climate very differently (Coyle, Sleeman, & Adams, 1995). A study of attitudes toward work and retirement found four types of potential relationships: a positive attitude to both work and retirement; job dissatisfaction, resulting in a person looking forward to retirement; a negative view of retirement, resulting in reluctance to retire; and job dissatisfaction combined with negative anticipation of retirement (London & Greller, 1991). Similarly, Ringenbach and Jacobs (1995a) suggested that individual characteristics, not just environmental conditions and work assignments, are important in understanding workers' perceptions of safety and job satisfaction. Site-specific solutions and health and safety programs will be needed. It is unlikely that there will be a single solution for keeping healthy and capable seniors in the work force.

Americans with Disabilities Act

Enactment of the Americans with Disabilities Act (ADA) provided work place protection to those with physical disabilities, including those with disabilities considered expected conditions of aging, e.g., arthritis and back ailments. In most cases, the ADA made it unlawful for an employer not to make reasonable accommodation of physical or mental limitations of an employee with a disability. Although use has been rare thus far, the increasing number of older workers may expand the frequency of access to the protection afforded by the ADA in the future (Sterns & Mikos, 1995).

When a qualified worker has requested provision of a reasonable accommodation, the employer is required to make an effort to determine the appropriate accommodation. According to the United States Government (U.S. Equal Opportunity Commission & U.S. Department of Justice, 1991), finding the appropriate accommodation should be accomplished using a process that involves not only the employer, but also the individual.

Research and Literature Related in Methodology

The research literature reported a number of efforts that used surveys to study perceptions and attitudes. A high percentage of research in the affective domain has been descriptive in nature, involving the assessment of attitudes, opinions, and perceptions, usually collected using questionnaire surveys, interviews, or observation (Gay, 1996). Surveys have been used to collect data from samples of populations (sample survey), and from entire populations (census survey) to determine the current status with respect to one or more variables.

Many surveys include Likert agreement scales that consist of a series of attitude statements representing extremes, either clearly favorable or clearly unfavorable. Degrees within the response alternatives provide the opportunity for scoring responses according to the intensity of the attitude. Although convention is to treat the alternatives to Likert scales as interval data, the various responses (three-point, five-point, seven-point, etc.) do not represent equal gradations of attitude. Nonetheless, the use of parametric statistics has become the method commonly used to analyze responses to Likert scale attitude surveys, and research reports that use parametric statistics have withstood the scrutiny of refereed

journals such as the Journal of Safety Research.

Traditional health and safety indicators such as lost time and recordable injury rates only measure whether or not injuries have occurred, not the effectiveness of a safety program (Vogel, 1992). Surveys can be used to supplement statistical data to indicate worker perceptions of management commitment to older worker health and safety. Surveys provide information on the safety program from the perspective of the program's users, the employees, and often point out inconsistencies between what management thinks it has implemented or accomplished and what workers perceive to be reality (Kedjidjian, 1995).

One study in the safety and health arena was conducted by Ringenbach and Jacobs (1995b), researchers at the Pennsylvania State University. Their study examined those individual and organizational variables that contribute to work place injuries. The researchers constructed a survey booklet that contained sections targeting personal factors (physical fitness and health, personal safety orientation, and cognitive slips) and one organizational factor (organizational safety orientation). With the exception of the cognitive slips section, all items were developed by the researchers. Item responses were from a seven-point Likert scale set of alternatives, strongly agree to strongly disagree.

For organizational safety orientation, item development was based on a content validity approach where concepts were defined and items developed to match the content domain. The researchers stated that they considered this to be an initial approach to validating the instrument. They suggested a more direct test of validity would be additional use of the instrument followed by correlation with injury statistics. Cronbach's alpha reliability was .88.

Personal safety orientation items were developed based on topics considered important to safe work practices by the management of the plant where the study was conducted. Scale reliability was .48. The physical fitness and health items were based on daily fitness routines and healthy versus unhealthy lifestyles as compared to other persons. Scale reliability was .78. The cognitive slips scale was an existing instrument developed by Broadbent, Cooper, Fitzgerald, and Parks in 1982 and reported to have content validity based on its prior development and use. Scale reliability was .87.

The researchers used the instrument to survey worker health and safety attitudes at a Northeastern nuclear power plant. Convenience sampling was used to administer the 67-item survey to 213 subjects in operations, maintenance, supervision, and clerical departments. Approximately 75 percent of the subjects were between the ages of 31 and 50. Average plant seniority was almost 13 years.

A correlation matrix of the four sections of the instrument plus injuries, age, percent time spent in physical labor showed significant correlations at the .05 and .01 levels. Significant ($p < .01$) correlations supported the first hypothesis, that age accounts for differences in fitness and other perceptions in the work place.

Because some of the subjects worked in heavy physical labor while others were office workers, the second hypothesis was tested using step-wise regression analysis. In step one, the dependent variable personal safety was regressed on the variable percent of time engaged in physical labor. Step two looked at predicting personal safety using the variables cognitive slips, fitness perception, and age. This process was repeated for organizational safety. Results showed that both individual characteristics and

environmental (work area) conditions affected a worker's perception of safety. Approximately 21 percent and 13 percent of the variance in the organizational safety score and personal safety score, respectively, were explained by this analysis.

Two injury measures were used to analyze the third hypothesis: whether a worker reported an injury, regardless of its severity, and the number of missed work days resulting from an injury. The analysis built on results of testing the second hypotheses by adding safety orientation measures into the third step of the regression model. Testing the third hypothesis showed the percent of time in physically demanding jobs explained 12 percent of the variance in injuries. Safety orientations explained another four percent of the variance. The researchers concluded that age directly impacts the number of days lost due to injury and that older workers perceived management of the plant supported a safe work environment.

Jacobson, Reutzel, and Hollingsworth (1992) conducted a random sample survey of school principles to determine perceptions of their understanding of issues in elementary reading instruction. The researchers constructed a survey instrument that included a three-point forced-choice scale (quite helpful, moderately helpful, not very helpful) that reflected opinions about the usefulness of various reading information sources. Responses in each of the three categories were converted to numeric values, and means and standard deviations were calculated to facilitate comparisons of the information sources.

Research and Literature Related in Content and Methodology

There are numerous examples of research that used survey methodology to study variables considered important to understanding occupational health and safety. These studies helped identify improvements in various health and safety programs.

Coyle, Sleeman, and Adams (1995) used questionnaires to study factors of the safety climate in two Australian health care and social services organizations. The organizations were similar in size and job tasks and both were managed by the same parent company. Nominal group technique was used to determine the relative perceived importance of health and safety issues. As a result, 26 items were developed to elicit responses on a seven-point Likert scale.

Participants in the research were selected as a result of convenience sampling and included workers involved in office, nursing, and social work duties. Questionnaires were distributed to all members of both organizations. A response rate of approximately 60 percent was obtained.

Questionnaire data were analyzed using principal component factor analysis with varimax rotation. Items that did not load above 0.4 on the factors identified (work environment, training and management attitudes, company policy, etc.) were not included in the final rotated analysis. Results were used to explain causes of variance in perceptions of the safety climate. The researchers found that the occupational health and safety issues perceived important by the workers of the two organizations were substantially different, suggesting there are no universal safety climate factors. They also concluded that it is important for safety managers who design occupational health and safety programs to

assess the safety factors applicable to the individual organization. The researchers stated use of the questionnaire was an appropriate way to measure safety climate.

A Scandinavian safety climate instrument (Mattila, Hyttinen, & Rantanen, 1994) was developed to measure safety attitudes. The 48-question worker and 29-question supervisor questionnaires used a five-point response scale in which the higher the rating, the stronger the opinion. The questionnaire was given to all 283 construction workers and supervisors at 16 sites of the same construction company in southern Finland. The response rate from this convenience sample was 77 percent.

In addition to the questionnaire, the researchers used an 18-item safety checklist to determine the safety level of the sites. Each of the 18 items were categorized as either walkway, environment, workstation, or personal protective equipment. Written assessment criteria were developed for each item and observations of each work site were made by trained research assistants. Interrater reliability ranged from 76 to 100 percent.

Observations were made on different days and at different times each day and observed behaviors were classified as correct or incorrect. Using observation results, a safety index [number correct/(number correct + number incorrect)] was calculated for 12 sites. The mean value was 76 percent.

Worker responses were correlated with total safety indices and found to be significantly correlated ($r = 0.31$, $p < .05$). Worker safety climate ratings and the indices for walkways and materials storage were significantly correlated ($r = 0.72$, $p < .001$). The researchers concluded that objective measurements of the work environment (safety index) and subjective assessments (safety climate) yield similar results.

Convenience sampling such as that used by Mattila, Hyttinen, and Rantanen often includes every member of a selected group. The results obtained from convenience sampling are a very precise and reliable measurement of the attitudes of that group of workers. However, a problem with using groups just because of their availability is the inability to apply results to other groups or to make generalizations about groups not in the sample. Results of convenience sampling can only be deemed applicable to other groups that are essentially the same as the group sampled.

Roberts (1995) conducted descriptive research at the Virginia Polytechnic Institute and State University that culminated in the development of a 33-item safety climate survey for occupational safety. Over one-thousand industrial workers, mostly skilled, in Washington State, Texas, Tennessee, and Georgia provided five-point Likert scale responses to the survey questions. Most of the employees included in the convenience sample were either maintenance or operations workers. At the Washington site, the survey was given to two large groups of employees before safety training. The Georgia and Tennessee sites administered the survey in small group safety meetings. In Texas, the survey was made available but a specific time was not set aside for employees to complete the survey form. Survey responses were scored by assigning points (1 = highly disagree to 5 = highly agree) followed by common factor analysis with oblique rotation to identify those questions that could be interpreted as management support for safety, peer support for safety, and personal responsibility for safety.

A Cronbach's alpha internal reliability analysis of the survey instrument was conducted for the original full scale items and a reduced scale. The reduced scale deleted six items resulting in an increased alpha. The full scale alpha was .84 and the reduced scale .87. Reduced scale alpha ranged from .84 to .89 at individual plant sites.

Eastman (1996) compiled a questionnaire that included measurement of job satisfaction of older workers. Overall job satisfaction was measured using a three-item measure from the Michigan Organizational Assessment Questionnaire with a coefficient alpha of .77. Specific elements of job satisfaction were also measured, including job security (two items; Spearman Brown reliability = .73); pay satisfaction (two items; Spearman Brown reliability = .86); satisfaction with co-workers (three items; Spearman Brown reliability = .64); satisfaction with supervision (three items; Spearman Brown reliability = .87); and development and growth satisfaction (four items; Spearman Brown reliability = .84). Responses to each item were made on a seven-point Likert scale. A pilot test was conducted to determine questionnaire readability and to determine the time needed for its completion. The questionnaire was administered to two samples of employees aged 50 years and above. Subjects in one sample were 510 public sector county employees while the other sample was 2,230 private sector workers of a financial institution. The questionnaire was mailed to all employees 50 and above. Subjects in this convenience sample were located in the Southeastern United States.

Response rates of 52 percent and 44 percent were obtained for the private sector and public sector, respectively. Data were analyzed by calculating means and standard deviations. To assess meaningful differences between the samples, t-tests were used.

Principal component analysis was used to conclude job satisfaction variables were moderately to substantially correlated for both samples. A Principal Components Analysis (PCA) with varimax rotation was then conducted for the purpose of reducing the number of intercorrelated variables to mitigate problems with multicollinearity and to create meaningful factors that were the same for comparison purposes across the two samples.

Cattrell's scree test was used to determine the number of factors to retain from the PCA. Descriptive discriminant analysis was conducted to interpret the nature of sample differences. Linear discriminant functions accounted for 29 percent of between group differences.

Summary

From the review of existing literature, there is a need to better understand the attitudes of older workers about the health and safety climate of their work places. Understanding these attitudes can help identify disincentives for continued employment. The need for such information from craft workers is especially important because demand for their fully developed work skills will increase in the future as capable young workers will not always be available to fill vacancies.

Experience also shows that managers who are willing to make changes in the work environment can have a positive influence on worker safety performance. Carefully designed changes can make the work place more flexible and accommodating to the aging worker. Unfortunately, results (Hurd & McGarry, 1993) indicate most of today's older workers are in jobs with little flexibility.

Descriptive research methodology using scaled instruments has been used to successfully measure attitudes, opinions, and perceptions about a variety of topics. Properly constructed scales can be used to help identify needed improvements in occupational health and safety.

CHAPTER III

METHODS AND PROCEDURES

Introduction

This chapter summarizes the methods and procedures used to collect, tabulate, and analyze research data. The purpose of this study was to evaluate differences between skilled craft workers' and other workers' (1) assessments of job characteristics important to occupational health and safety, and (2) perceptions of employer willingness to accommodate older employees with declining work capacity. Three research questions addressed the purpose:

1. How do skilled craft workers assess the health and safety of their work places as compared to workers in other job classifications?
2. How do skilled craft workers in the following subgroups assess the health and safety of their work places:
   a. older (57-61 years) and less old (51-55 years),
   b. male and female,
   c. Black, Caucasian, and Latino, and
   d. union members and non-union members?
3. How do skilled craft workers perceive their employers' willingness to accommodate older employees as compared to workers in other job classifications?

Surveys have been used effectively to research worker perceptions of occupational health and safety conditions. Results of descriptive research often point out inconsistencies between the safety program that management thinks it has implemented and the program workers perceive to be reality.

The Health and Retirement Study (HRS) started in 1990 when the National Institute on Aging awarded the University of Michigan Institute for Social Research a contract to plan and execute a study to collect data on retirement. During 1991, nine planning committees met to discuss the most important questions to be included in the study. According to study investigators (Juster & Suzman, 1995), there was a lack of data on mismatches between physical or cognitive status and job demands, and on work place accommodation. In 1992, the HRS used a questionnaire to collect data for the purpose of analysis of behavioral processes that occur at older ages. Persons aged 51 to 61 years, and their spouses, were interviewed in their homes. Over 7,600 households and over 12,600 persons were included. The HRS focused on health, disability, work status, and job characteristics of persons born between 1931 to 1941 and provided data for researchers with an interest in retirement and older workers. Some of the topics included in the HRS questionnaire were health and cognitive conditions, retirement plans, attitudes and opinions about occupational health and safety climate, employment status and job history, and demographics.

In this study, perceptions and objective measures of various job characteristics important to occupational health and safety were measured using data collected by the HRS. Data were collected in 1992 when the participants were 51-61 years old. This age

range was desirable for study because it represented workers approaching the traditional retirement ages of 62 to 65 years.

Descriptive research methodology was used because it provided a mechanism to analyze the assessments and perceptions of two groups of workers (skilled craft and other) on: (1) job conditions associated with occupational health and safety, and (2) the willingness of management to accommodate older workers with declining work capacity. This methodology also facilitated the application of statistical analyses to determine if there were significant differences in these measures. Similar methods of analysis were used in recent descriptive studies of occupational health and safety conducted by Cuthbert (1993) and Mattila, Hyttinen, and Rantanen (1993).

Study Population

The HRS target population included all adults living in households in the contiguous United States who were born between 1931 and 1941. Persons in institutional care were excluded.

The HRS used a national area probability sampling technique to obtain a stratified random national sample of 12,654 persons in approximately 7,600 households. The sample included approximately 9,500 targeted participants. The balance were spouses of participants. Sampling design was based on recommendations contained in reports of expert groups convened by the National Institute on Aging. To be included, at least one age-eligible person had to live in the household: married couple with both persons age-eligible, single unmarried age-eligible person, or married couple with one person age-

eligible. Based on 1991 Current Population Survey data, approximately 19.2% of U.S. households met criteria for participation in the HRS.

Blacks were oversampled 2:1 relative to Caucasians because of the potential for different retirement decision factors. Latinos were oversampled at the same 2:1 ratio because of their relatively small sample size in the population and because of the lack of prior research on this segment of the population.

This study used data collected from 992 skilled craft workers and 3510 other workers who participated in the HRS. Figure 1 lists the occupations included in the "skilled craft" and "other" job classifications. Sample selection was limited to those persons who worked full-time (35 or more hours per week) for someone else. These restrictions were made for the following reasons:

1. Skilled craft workers represent a labor supply projected to be in demand in the decades ahead. Also, there are substantial physical demands required of many skilled craft job assignments. Due to a declining birth rate among baby boomers and other factors, a shortage of workers in critical skill positions is anticipated in the 21st century (Allerton, 1994; Graves, 1997).
2. Part-time or retired workers in the 51 to 61 year age range have already made the decision to leave full-time employment, and their current job experiences may not reflect conditions or characteristics of their full-time occupation.
3. Self-employed workers have more control over their work activities than persons who work for others.

Skilled Craft Workers (992)

1. Mechanics and repairers, Code 011 (219)
   - aircraft mechanics
   - heavy equipment mechanics
   - industrial machine repairers
   - auto mechanics
   - electronic repairers
   - heating, air conditioning, and refrigeration mechanics
   - millwrights

2. Construction trades, Code 012 (143)
   - brickmasons and stonemasons
   - carpenters'
   - electricians
   - painters, construction and maintenance
   - roofers
   - structural metal workers

3. Precision production, Code 013 (205)
   - tool and die makers
   - machinists
   - boilermakers
   - sheet metal workers
   - cabinet makers
   - tailors
   - upholsterers
   - bookbinders
   - butchers
   - stationary engineers

4. Machine operators, Code 014 (425)
   - milling and planing machine operators
   - forging machine operators
   - numerical control machine operators
   - heat treating equipment operators
   - welders and cutters
   - solderers and brazers

Other Workers (3510)

- Managerial specialty operations, Code 001
- Professional specialty operations and technical support, Code 002
- Sales, Code 003
- Clerical, administrative support, Code 004
- Service: private household, cleaning, and building services, Code 005
- Service: protection, Code 006
- Service: food preparation, Code 007
- Health services, Code 008
- Personal services, Code 009
- Farming, forestry, fishing, Code 010
- Operators: transport, Code 015
- Operators: handlers, Code 016

Note: The number of participants in each worker category is shown in parentheses.

Figure 1. Job Classifications and Occupations of Workers in the Sample

Instrumentation

The Health and Retirement Study Questionnaire

The instrument used to collect data was the HRS questionnaire, administered in face-to-face interviews with participants. The comprehensive survey instrument contained the following sections, with approximate administration times in parentheses (Juster & Suzman, 1995):

Demographics (3 minutes)
Physical Health and Functioning (15 minutes)
Housing and Mobility (8 minutes)
Family Structure (16 minutes)
Current Job (18 minutes)
Past Job (8 minutes; asked only if the participant was not employed)
Work History (5 minutes)
Disability (20 minutes, with disability; 2 minutes, without disability)
Retirement Plans (8 minutes)
Cognition and Expectations (11 minutes)
Net Worth (7 minutes)
Income (11 minutes)
Insurance (8 minutes)
Widowhood (2 minutes)
10 Experimental Modules (500-800 cases per module)

Responses to items in the Demographics and Current Job sections were used in this study.

The method of development of items in the HRS questionnaire provided favorable evidence of their validity and reliability for measuring older worker assessments and perceptions of health, safety, and job characteristics. Although similar to other surveys in many ways, the HRS was unique in that its design phase was lengthy, included input from approximately 100 federal and research statistical representatives, and merged the discipline contributions of sociology, economics, epidemiology, and demography. When

assessing what items should be included to analyze job characteristics and demands, planners utilized existing measures for physical characteristics and developed items for cognitive requirements such as eyesight, concentration, and interpersonal skills (Juster & Suzman, 1995). Six HRS working groups including a steering committee, a health condition and status committee, and a data monitoring committee, evaluated issues of survey content, design, and implementation.

Although certain items in the HRS questionnaire were similar to those in other research instruments (e.g., Coyle, Sleeman, & Adams, 1995; Zohar, 1980), the questionnaire was designed specifically for use with older people in the pre-retirement phase of life. Responses to questions about job characteristics related to health and safety were in two formats:

1. Four-point objective alternatives (all or almost all of the time, most of the time, some of the time, and none or almost none of the time) that measured worker self-assessment of exposure frequency to job characteristics important to health and safety.
2. Four-point Likert response alternatives (strongly agree, agree, disagree, strongly disagree) that measured worker attitudes of agreement or disagreement with employer policies affecting older workers.

Data

To ensure privacy and confidentiality, some HRS data were masked by HRS administrators. This study was conducted using the publicly accessible data base; no variables important to this study were masked in a way that hindered research. Data for

the following demographic variables were used: age, job classification, race, gender, and status of union membership. Items were selected based on their contribution of data on safety climate and on the willingness of management to accommodate older workers.

Human Subjects Factors

45CFR46.101(b) defines those research activities involving human subjects that are exempt from review by the University's Committee on Research Participation (CRP). One of the exempted categories is:

> "(4) Research involving the collection or study of existing data, documents, records, pathological specimens or diagnostic specimens, if these sources are publicly available or if the information is recorded by the investigator in such a manner that subjects cannot be identified, directly or through identifiers linked to the subjects."

This research used publicly available data that had been masked to prevent identification of subjects. A "Form A" was approved classifying this research as being exempt from CRP review.

Procedure for Data Collection

HRS data were collected in individual in-home, face-to-face interviews by trained interviewers using preprinted questionnaires. Response rate was about 82 percent. Survey participants were usually paid $10 per person. Age distribution of HRS participants closely paralleled the age distribution of persons 51-61 years old in the population. The largest disagreement was for those 51 years old; this age group constituted 10.7 percent of the

1990 U.S. Census 51-61 age group versus an HRS percentage of 9.8 percent.

Data Tabulation

Data used in this study were subjected to extensive consistency checking by HRS administrators. The data were downloaded from the HRS Internet home page to a computer loaded with the SAS® statistical program. Using the selection criteria described earlier, the responses and demographic data applicable to this study were identified. SAS® results were reviewed for accuracy by a senior statistician prior to use.

Statistical Design

To describe the assessments and perceptions of sample members, independent variables of classification and dependent variables of responses to questionnaire items were subjected to statistical analyses. The first step was to describe the data with descriptive statistics using a measure of central tendency (mean) and a measure of variability (standard deviation). Next, inferential statistics (t-test, ANOVA, and the Scheffé test) were used to facilitate inferences about workers based on the responses of the HRS sample. Selection of statistics was based on the recommendations of Gay (1996) and the practices of other researchers (e.g., Cuthbert, 1993).

Testing was conducted at the .05 level of significance. This reference probability represented the alpha-level or the probability of making a Type I error. At the .05 level, if 100 samples had been selected, and 100 hypotheses tested, the wrong conclusion would have been made about five times.

Independent, Two Sample t-test on Means

Except for Research Question No. 2, part c, the two-sample t-test was the parametric test used to compare means of the independent samples. The t-test null hypothesis was that the means for the two groups were equal. Four assumptions had to be satisfied before applying the t-test. They were:

1. Each sample was a random subset of the population it represented.
2. Each subject's score was not influenced by what happened to any other subject.
3. Each population was normally distributed in terms of the dependent variable.
4. The populations of the two independent samples had the same degree of variability relative to the dependent variable.

As discussed earlier in this chapter, HRS experimental design and controls provided evidence that the samples were randomly selected from the population of 51 through 61 year old residents of the United States. For large samples like those used in this study, nonnormality of the populations is typically not disruptive to the functioning of t-tests (Ferguson & Takane, 1989). The F statistic, F′, was used to test the equality of population variances:

$$F' = (\text{larger of } s_1^2, s_2^2) \,/\, (\text{smaller of } s_1^2, s_2^2)$$

The probability of a greater F value under the null hypothesis (equality of population variances) was given by a p-value. The greater the difference in variance, the smaller the p-value. Where the p-value was larger than 0.05, the exact two-sample t-test was used,

corresponding to a .05 significance level for the F-test for equal variances:

$$t=(x_1-x_2)/\sqrt{s^2(1/n_1+1/n_2)}$$

where s^2 was the pooled variance

$$s^2 = [(n_1 - n_2)s_1^2 + (n_2 - 1)s_2^2] / (n_1 + n_2 - 2),$$

and s_1^2 and s_2^2 were the sample variances of the two groups.

When the p-value was smaller than 0.05, an approximate two-sample t-test was used to account for the inequality of variance. This method calculated Satterthwaite's approximate t-statistic, t', using adjusted pooled variance with adjusted degrees of freedom (Steel & Torrie, 1980):

$$t'=(x_1-x_2)/\sqrt{w_1+w_2}$$

where

$$w_1 = s_1^2 / n_1 \quad , \quad w_2 = s_2^2 / n_2$$

For both t and t', if the t-statistic was equal to or larger than the critical value of t, then the test indicated the means of the groups were significantly different ($p < .05$). If the t-statistic was smaller than the critical value of t, then the test indicated the means of the groups were not significantly different, meaning the t-statistic did not reach signficance at the .05 level.

ANOVA of Means

For Research Question No. 2, part c, an analysis of variance (ANOVA) test was used to identify significant differences ($p < .05$) in the means of the three racial groups of skilled craft workers. The Scheffé multiple comparison test was used to identify those pairs of groups that had significantly different means.

The assumptions required for use of an ANOVA test were the same as those for a t-test. Testing of the assumptions was handled in a manner similar to the t-test. The analysis of variance F-statistic for comparing group means was reported to work well even when used with sample data from nonnormal populations (Schlotzhauer & Littell, 1987). The assumption of equal variances was assessed by calculating F' for each pair of samples.

Independent Variables

Independent variables were classification factors of job title, age, gender, race, hours worked per week, status of self-employment, and union affiliation and are presented in Figure 2.

Dependent Variables

Figure 3 presents the dependent variable called the Occupational Health and Safety Climate Scale (OHSCS). This variable elicited worker assessment of the frequency of job characteristics important to occupational health and safety: physical effort, heavy loads, awkward positions, eyesight, concentration, pace, repetition, job freedom, and helpful co-workers. Figure 4 presents the dependent variable called the Willingness to Accommodate Scale (WAS). This dependent variable elicited worker perceptions of the willingness of

Item	HRS Variable
The following items were used to select sample members:	
In what year were you born, 1931 through 1941? (Used to segregate by age; 1992 baseline.)	203
Do you work for someone else, are you self-employed, or what? (Only those working for someone else were included.)	2718
How many hours a week do you usually work on this job? (Only those working 35 or more hours per week were included.)	2722
The following item was used to define sample groups in Research Questions 1 and 3:	
What is the official title of your job? (Used to segregate skilled craft workers and all other workers.)	2720
The following items were used to define sample groups in Research Question 2:	
What is your race: Caucasian, Black or African American, Hispanic/Latino, etc? (Used to segregate by race.)	48
Are you male or female? (Used to segregate by gender.)	47
Are you covered by a union or employee-association contract? (Used to segregate union member/non-union member responses.)	2819

Figure 2. Independent Variables

Item	HRS Variable
My job requires lots of physical effort (PHYSICAL EFFORT)	3301
My job requires lifting heavy loads (HEAVY LOADS)	3302
My job requires stooping, kneeling, or crouching (AWKWARD POSITIONS)	3303
My job requires good eyesight (EYESIGHT)	3304
My job requires intense concentration or attention (CONCENTRATION)	3305
My job requires me to keep up with the pace set by others (PACE)	3309
My job requires me to do the same things over and over (REPETITION)	3310
I have lots of freedom to decide how I do my own work* (JOB FREEDOM)	3312
The people I work with are helpful and friendly* (HELPFUL CO-WORKERS)	3313

* Item is reverse worded.

NOTE: Response alternatives were all or almost all of the time, most of the time, some of the time, and none or almost none of the time.

Figure 3. Occupational Health and Safety Climate Scale

Item	HRS Variable
In decisions about promotion, my employer gives younger people preference over older people (PREFERENCE)	3324
My co-workers make older workers feel that they ought to retire before age 65 (RETIRE EARLY)	3325
My employer would let older workers move to a less demanding job with less pay if they wanted to* (JOB FLEXIBILITY)	3326
I could do my job a lot better if I received training to update my job skills (TRAINING)	3314
My job requires me to do more difficult things than it used to (JOB DIFFICULTY)	3315
My job involves a lot of stress (STRESS)	3317

* Item is reverse worded.

NOTE: Response alternatives were strongly agree, agree, disagree, and strongly disagree.

Figure 4. Willingness to Accommodate Scale

work place management to accommodate older workers with declining physical work capacity: preference to younger workers, pressure to retire early, job flexibility, training, job difficulty, and stress.

Standard Error

For each variable in the OHSCS and WACS, standard error was calculated to determine the extent to which the sample mean approximated the population mean. The smaller the standard error of the mean, the smaller the sampling error. Sample size is the major factor affecting the standard error. Because of the large sample sizes used in this study, sampling error was not a major concern.

Scoring

For items measuring self-assessments of job characteristics important to health and safety, individual responses to the OHSCS were scored using the following scheme: All or almost all the time = 1, Most of the time = 2, Some of the time = 3, and None or almost none of the time = 4. Reverse order scoring was used for two reverse-worded items (Variables 3312 and 3313). The lower the score, the more frequent the assessment of occurrence.

Likert-scale items measuring perceptions of willingness to accommodate were scored using the following scheme: Strongly Agree = 1, Agree = 2, Disagree = 3, and Strongly Disagree = 4. Reverse order scoring was used for one reverse-worded item (Variable 3326). The lower the score, the stronger the perception of agreement.

Data Analyses

Mean scores and standard deviations for the OHSCS and the WAS were calculated for the following: the OHSCS scale; each of the nine items that made up the OHSCS scale; the WAS scale; and each of the six items that made up the WAS scale.

Research Question Analyses

Research Question No. 1: **How do skilled craft workers assess the health and safety in their work places as compared to workers in other job classifications?**

A t-test was used to test for significance ($p < .05$) of difference between the mean responses of skilled craft and other workers on the overall OHSCS and individual items in the OHSCS. The following were performed: distribution of scores on the OHSCS; mean responses on the OHSCS and on each item that made up the OHSCS, by worker classification; independent sample t-tests of mean responses on the OHSCS; and independent sample t-tests of mean responses on each of the items that made up the OHSCS.

Research Question No. 2: **How do skilled craft workers in the following subgroups assess the health and safety of their work places: older and less old; male and female; Black, Caucasian, and Latino; and union and non-union members?**

A t-test was used to compare the significance ($p < .05$) of differences between the mean responses of subgroups of skilled craft workers on the overall OHSCS and individual items in the OHSCS. Responses of the following subgroups were examined: older (57-61 years) and less-old (51-55 years); male and female; and union members and non-union members. The following were performed: determination of skilled craft worker scores on

the OHSCS; independent sample t-test of mean responses on the OHSCS, by skilled craft workers aged 51-55 years and 57-61 years; independent sample t-test of mean responses on the OHSCS, by male and female skilled craft workers; and independent sample t-test of mean responses on the OHSCS, by union and non-union skilled craft workers.

An ANOVA test was used to determine whether or not there was a significant difference ($p < .05$) in OHSCS mean scores of Black, Caucasian, and Latino skilled craft workers. The Scheffé multiple comparison test was used to identify each pair of means that were significantly different. The following were performed: determination of skilled craft worker scores on the OHSCS; ANOVA of mean responses on the OHSCS, by Black, Caucasian, and Latino skilled craft workers; and the Scheffé multiple comparison test to determine which means were significantly different.

Research Question No. 3: **How do skilled craft workers perceive their employers' willingness to accommodate older workers as compared to workers in other job classifications ?**

A t-test was used to compare the significance of differences ($p < .05$) in mean scores between skilled craft and other workers on the overall WAS and individual items in the WAS. The following were performed: distribution of scores on the WAS; independent sample t-test of mean responses on the WAS; and independent sample t-test of mean responses on each of the items that made up the WAS.

Demographic Data

Demographic data were described as follows: distribution by worker classification; distribution of skilled craft workers by age; distribution of skilled craft workers by gender;

distribution of skilled craft workers by race; and distribution of skilled craft workers by union affiliation.

Summary

This chapter presented the research methodology and procedures, including issues related to the study population, instrumentation, and methods of statistical analyses. Data from the Health and Retirement Survey were used. The HRS used descriptive research methodology to obtain the assessments and perceptions of skilled craft and other workers concerning the safety climate of their work places and willingness of their management to accommodate older workers with declining physical work capacity. Chapter IV contains the results and analyses of the data collected using the methodology and procedures described in Chapter III.

CHAPTER IV

ANALYSIS OF THE DATA

Introduction

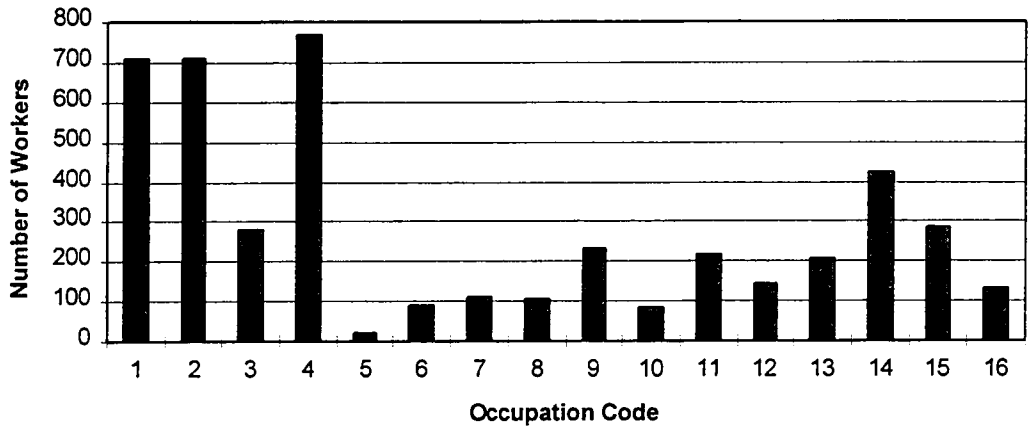
This chapter provides the results of the analysis of Health and Retirement Study (HRS) data used in this study. The purpose of this study was to evaluate differences between skilled craft workers' and other workers' (1) assessments of job characteristics important to occupational health and safety, and (2) perceptions of employer willingness to accommodate older employees with declining work capacity. Three research questions addressed the purpose:

1. How do skilled craft workers assess the health and safety of their work places as compared to workers in other job classifications ?
2. How do skilled craft workers in the following subgroups assess the health and safety of their work places:
   a. older (57-61 years) and less old (51-55 years),
   b. male and female,
   c. Black, Caucasian, and Latino, and
   d. union members and non-union members?
3. How do skilled craft workers perceive their employers' willingness to accommodate older employees as compared to workers in other job classifications ?

The data used in this study were collected by the HRS from a nationwide sample of persons aged 51 to 61 years. Data were downloaded from the HRS database to a computer for analysis using the SAS® statistical program.

Demographic Analyses

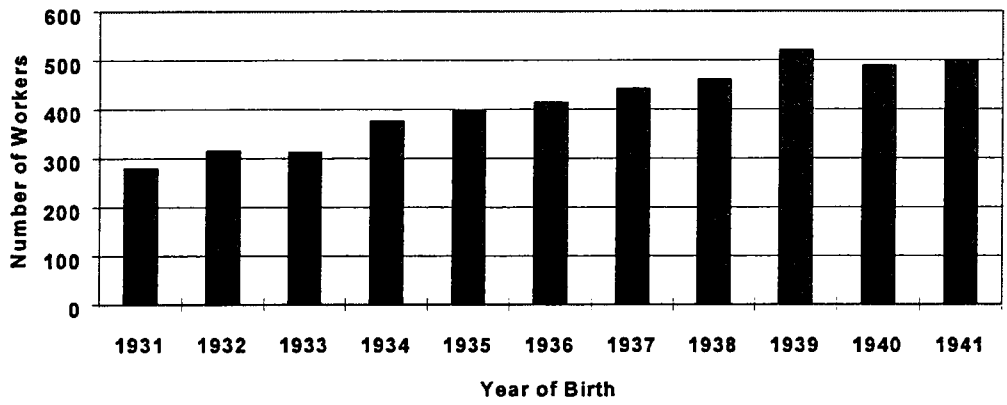
The target population for the Health and Retirement Study was adults living in households in the contiguous United States who were born between 1931 and 1941 (ages 61 years through 51 years, respectively). Although the HRS included full, part-time, retired and unemployed workers, the sample for this study was limited to those 4,502 HRS participants who were full-time workers in the employment of someone else. Figure 5 shows the distribution of the sample by occupation. Skilled workers represented by occupation codes 11, 12, 13, and 14, comprised 22 percent (N=992) of the sample and workers in other job classifications made up the remaining 78 percent (N=3510). More older workers (N=766) were employed in clerical positions than any other single occupation. Within the skilled craft job classification, machine operators (N=425) were the largest subgroup, followed by mechanics and repairers (N=219), precision production workers (N=205), and construction trades workers (N=143). Figure 6 shows the sample distribution by year of birth. The mode was year 1939 (corresponding to 53 years of age) and the mean was 55.8 years. Younger workers comprised a larger segment of the sample than older workers, paralleling the general working population.



NOTE: Skilled Craft Workers = N = 992 (22 percent)
- 11 = Mechanics/repairers = N = 219
- 12 = Construction trades = N = 143
- 13 = Precision production = N = 205
- 14 = Machine operators = N = 425

Other Workers = N = 3510 (78 percent)
- 1 = Managerial = N = 710
- 2 = Professional = N = 711
- 3 = Sales = N = 280
- 4 = Clerical = N = 766
- 5 = Service;household = N = 21
- 6 = Service;protection = N = 88
- 7 = Service;food = N = 112
- 8 = Health Services = N = 104
- 9 = Personal Services = N = 235
- 10 = Farming/forestry = N = 84
- 15 = Operators;transport = N = 267
- 16 = Operators;handlers = N = 132

Figure 5. Sample Distribution by Occupation



NOTE: 1931 = N = 279 (Age: 61 years)
1932 = N = 315 (Age: 60 years)
1933 = N = 312 (Age: 59 years)
1934 = N = 375 (Age: 58 years)
1935 = N = 397 (Age: 57 years)
1936 = N = 414 (Age: 56 years)
1937 = N = 442 (Age: 55 years)
1938 = N = 461 (Age: 54 years)
1939 = N = 520 (Age: 53 years)
1940 = N = 488 (Age: 52 years)
1941 = N = 499 (Age: 51 years)

Total = N = 4502

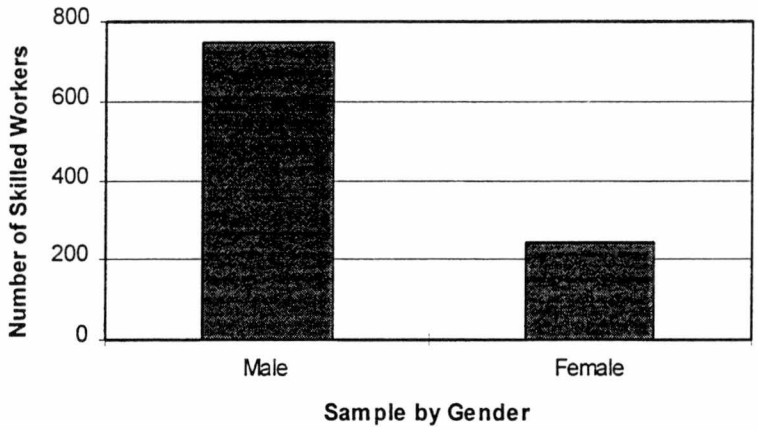
Figure 6. Sample Distribution by Year of Birth

For skilled craft workers, Figure 7 shows the distribution by gender. The sample contained 747 males (75 percent) and 245 females (25 percent). Figure 8 shows the race of skilled craft participants. Caucasian was the predominant racial group with 675 members (68 percent). Blacks and Latinos had 175 (18 percent) and 118 (12 percent) members, respectively. There were 24 persons (2 percent) of other races in the sample. Figure 9 shows participation by union affiliation. The sample contained 441 union members (44 percent) and 551 non-union members (56 percent). The typical skilled craft worker in the sample was a 55.8 year-old white male who did not belong to a labor union.

Assessment of Occupational Health and Safety Climate Scale Scores

Research Question No. 1: **How do skilled craft workers assess the health and safety of their work places as compared to workers in other job classifications ?**

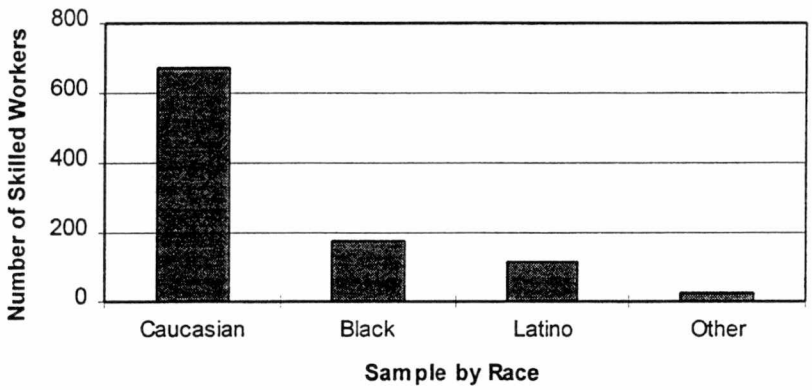
Scores from the nine items that comprised the Occupational Health and Safety Climate Scale (Figure 3) were used to address Research Question No. 1. These items elicited assessment of the frequency of working conditions that affected occupational health and safety climate . Each of the items asked participants to respond on a scale of 1 (all or almost all of the time) to 4 (none or almost none of the time). Possible scores on the overall OHSCS ranged between 9 (the lowest score possible) and 36 (the highest score possible). Figure 10 shows the distribution of OHSCS scores. The mode for the OHSCS was 24. The mean was 22.8 and the standard deviation was 4.04. The range was 9 to 34. The distribution was relatively normal around the mean, with a slight negative skew.



NOTE: Males = N = 747 (75 percent)
Females = N = 245 (25 percent)

Total = N = 992

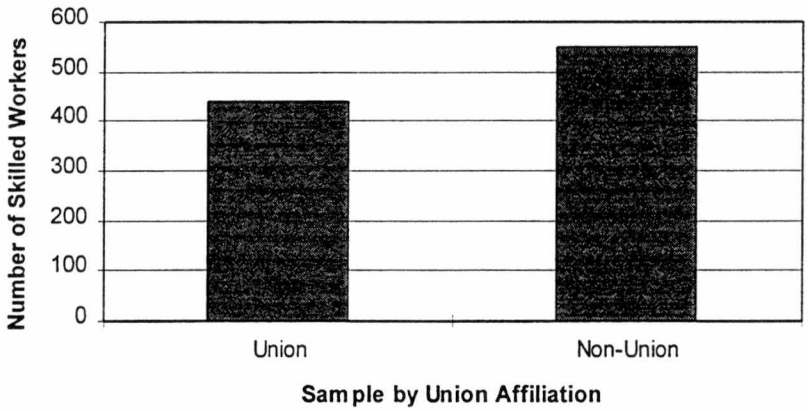
Figure 7. Skilled Craft Worker Sample Distribution by Gender



NOTE: Caucasian = N = 675 (68 percent)
Black = N = 175 (18 percent)
Latino = N = 118 (12 percent)
Other = N = 24 (2 percent)

Total = N = 992

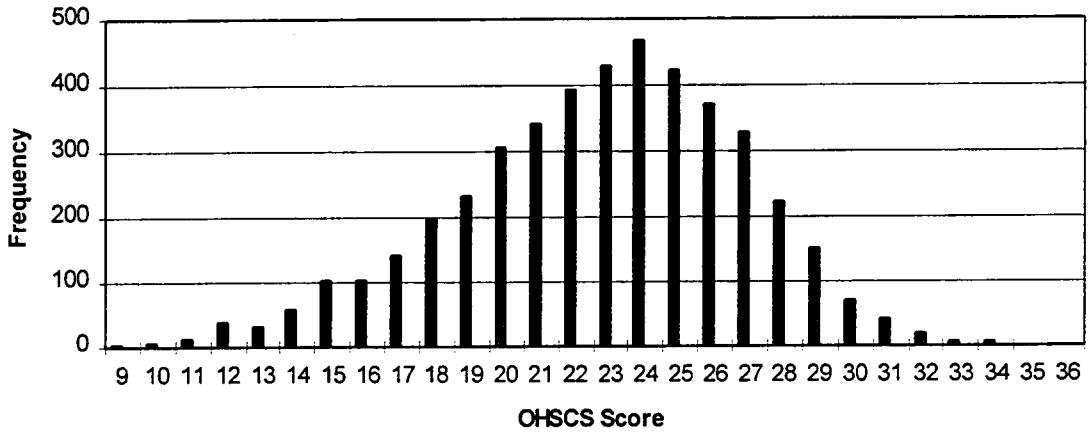
Figure 8. Skilled Craft Worker Sample Distribution by Race



NOTE: Union members = N = 441 (44 percent)
Nonunion members = N = 551 (56 percent)

Total = N = 992

Figure 9. Skilled Craft Worker Sample Distribution by Union Affiliation



NOTE:

Score 9 = N = 2	Score 23 = N = 429
Score 10 = N = 6	Score 24 = N = 467
Score 11 = N = 12	Score 25 = N = 421
Score 12 = N = 39	Score 26 = N = 371
Score 13 = N = 32	Score 27 = N = 330
Score 14 = N = 57	Score 28 = N = 224
Score 15 = N = 104	Score 29 = N = 151
Score 16 = N = 102	Score 30 = N = 71
Score 17 = N = 143	Score 31 = N = 42
Score 18 = N = 197	Score 32 = N = 18
Score 19 = N = 232	Score 33 = N = 7
Score 20 = N = 306	Score 34 = N = 5
Score 21 = N = 342	Score 35 = N = 0
Score 22 = N = 392	Score 36 = N = 0

Total = N = 4502

Figure 10. Distribution of Scores on the Overall Occupational Health and Safety Climate Scale

The independent variable for Research Question No. 1 was classification of worker. This variable was used to determine if there were significant differences between the scores of skilled craft workers and other workers on the OHSCS and on each of the nine items that comprised the OHSCS.

Mean scores of each worker group on the overall OHSCS and mean scores on each of the nine OHSCS items are shown in Tables 1 through 10. Prior to conducting t-tests for significance of difference in each pair of means, an F' statistic was calculated to determine if the homogeneity of variance assumption was violated. For variables 3301, 3302, 3303, 3304, 3310, 3312, and 3313, the p-value of the F' statistic was less than 0.05. For these variables, the approximate t-statistic was used to account for inequality of variance. For the overall OHSCS and variables 3305 and 3309, the p-value of the F' statistic exceeded 0.05 and the exact t-statistic for equal variances was used.

An examination of Table 1 indicates that the mean score on the overall OHSCS of skilled craft workers (21.34) was significantly lower ($p < .05$) than the score for other workers (23.20). This shows that skilled craft workers assessed their jobs as having more negative impact on health and safety than other workers.

Two-tailed t-tests of responses to the nine items that comprised the OHSCS showed significant differences ($p < .05$) in the mean responses on six (the range of possible scores on each item ranged from 1 to 4). Table 2 shows that skilled craft workers assessed their jobs to require physical effort (Variable 3301) significantly more often than other workers ($p < .05$). There was a larger difference in the means (2.18 versus 2.83) on this variable than any other. Table 3 shows that skilled craft workers assessed their jobs to require

Table 1. Comparison of Scores on the Overall Occupational Health and Safety Climate Scale by Job Classification

Worker Sample	N	Mean	Std. Dev.	Std. Error	Min.	Max.	df	t	p
Other	3510	23.20	4.05	0.07	9	36	4500	12.78	$p<.05$
Skilled	992	21.34	4.01	0.13	9	36			

$t_{.05} = 1.96$

Table 2. Comparison of Skilled Craft Worker and Other Worker Scores for Physical Effort (Variable 3301)

Worker Sample	N	Mean	Std. Dev.	Std. Error	Min.	Max.	df	t	p
Other	3510	2.83	1.12	0.02	1	4	1722.9	17.50	$p<.05$
Skilled	992	2.18	1.02	0.03	1	4			

$t_{.05} = 1.96$

Table 3. Comparison of Skilled Craft Worker and Other Worker Scores for Lifting Heavy Loads (Variable 3302)

Worker Sample	N	Mean	Std Dev.	Std. Error	Min.	Max.	df	t	p
Other	3510	3.39	0.92	0.02	1	4	1499.3	13.58	$p<.05$
Skilled	992	2.91	1.00	0.03	1	4			

$t_{.05} = 1.96$

Table 4. Comparison of Skilled Craft Worker and Other Worker Scores for Working in Awkward Positions (Variable 3303)

Worker Sample	N	Mean	Std. Dev.	Std. Error	Min.	Max.	df	t	p
Other	3510	3.06	0.97	0.02	1	4	1508.0	13.23	$p<.05$
Skilled	992	2.57	1.04	0.03	1	4			

$t_{.05} = 1.96$

Table 5. Comparison of Skilled Craft Worker and Other Worker Scores for Eyesight (Variable 3304)

Worker Sample	N	Mean	Std. Dev.	Std. Error	Min.	Max.	df	t	p
Other	3510	1.59	0.76	0.01	1	4	1693.0	0.82	NS
Skilled	992	1.57	0.71	0.02	1	4			

$t_{.05} = 1.96$

Table 6. Comparison of Skilled Craft Worker and Other Worker Scores for Concentration (Variable 3305)

Worker Sample	N	Mean	Std. Dev.	Std. Error	Min.	Max.	df	t	p
Other	3510	1.65	0.77	0.01	1	4	4500	-1.01	NS
Skilled	992	1.68	0.80	0.03	1	4			

$t_{.05} = 1.96$

Table 7. Comparison of Skilled Craft Worker and Other Worker Scores for Pace (Variable 3309)

Worker Sample	N	Mean	Std. Dev.	Std. Error	Min.	Max.	df	t	p
Other	3510	2.34	1.17	0.02	1	4	4500	-4.66	$p < .05$
Skilled	992	2.54	1.19	0.04	1	4			

$t_{.05} = 1.96$

Table 8. Comparison of Skilled Craft Worker and Other Worker Scores for Repetition (Variable 3310)

Worker Sample	N	Mean	Std. Dev.	Std. Error	Min.	Max.	df	t	p
Other	3510	2.08	1.00	0.02	1	4	1525.1	1.28	NS
Skilled	992	2.04	1.06	0.03	1	4			

$t_{.05} = 1.96$

Table 9. Comparison of Skilled Craft Worker and Other Worker Scores for Job Freedom (Variable 3312)

Worker Sample	N	Mean	Std. Dev.	Std. Error	Min.	Max.	df	t	p
Other	3510	2.94	0.97	0.02	1	4	1454.7	7.89	$p<.05$
Skilled	992	2.63	1.10	0.03	1	4			

$t_{.05} = 1.96$

Table 10. Comparison of Skilled Craft Worker and Other Worker Scores for Helpful Co-Workers (Variable 3313)

Worker Sample	N	Mean	Std. Dev.	Std. Error	Min.	Max.	df	t	p
Other	3510	3.32	0.71	0.01	1	4	1487.4	3.08	$p<.05$
Skilled	992	3.23	0.78	0.02	1	4			

$t_{.05} = 1.96$

lifting heavy loads (Variable 3302) significantly more often than other workers ($p < .05$). The mean scores (2.91 and 3.39) indicated that neither group performed heavy lifting on a frequent basis. Table 4 shows that skilled craft workers assessed their jobs to require working in an awkward position, e.g., stooping, kneeling, or crouching (Variable 3303), significantly more often (mean 2.57 versus mean 3.06) than other workers ($p < .05$). Table 7 shows that skilled craft workers assessed their jobs to require keeping up with a pace set by others (Variable 3309) significantly less often (mean 2.54 versus mean 2.34) than other workers ($p < .05$). Table 9 shows that skilled craft workers assessed that they have freedom to decide how to do their work (Variable 3312) significantly less often (mean 2.63 versus mean 2.94, reverse scores) than other workers ($p < .05$). Table 10 shows that skilled craft workers assessed that they worked with helpful and friendly people (Variable 3313) significantly less often (mean 3.23 versus mean 3.32, reverse scores) than other workers ($p < .05$). While statistically significant, the practical significance of this small difference is questionable.

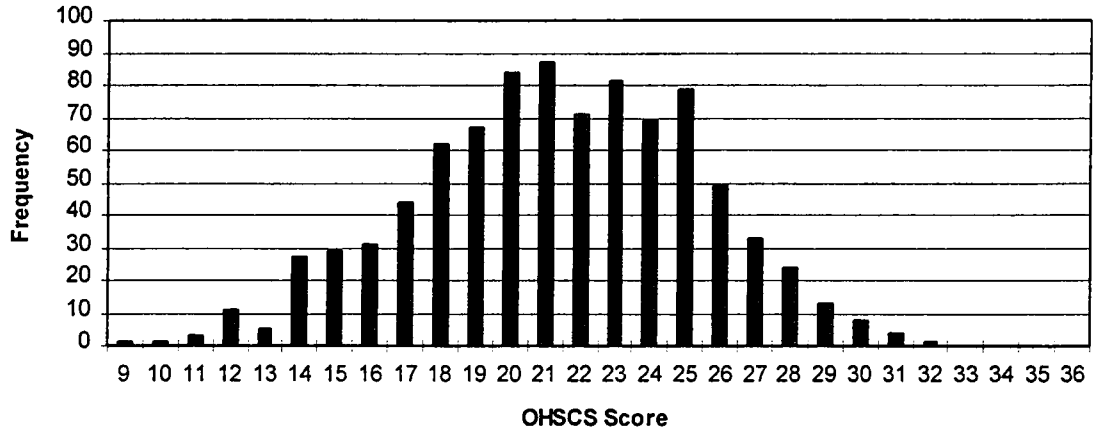
There were no significant differences in the mean responses of skilled craft and other workers on three items. An examination of Table 5 shows that both groups of workers assessed (1.57, 1.59) a need for good eyesight (Variable 3304). Table 6 shows that both groups of workers assessed (1.65, 1.68) their jobs to require intense concentration (Variable 3305). Table 8 shows that both groups of workers assessed (2.04, 2.08) their jobs as being repetitious most of the time (Variable 3310).

Research Question No. 2: **How do skilled craft workers in the following subgroups assess the health and safety of their work places: older and less old; male and female; Black, Caucasian, and Latino; and union and non-union members?**

The distribution of OHSCS scores for skilled craft workers used to address Research Question No. 2 is shown in Figure 11. The mode was 21. The mean score was 21.34, and the standard deviation was 4.01. The range was 9 to 32. The distribution was relatively normal around the mean, with a slight negative skew. The independent variables were age, gender, race, and union affiliation. These variables were used to determine if there were significant differences in OHSCS scores between subgroups of skilled craft workers.

Age. OHSCS scores for older workers born between 1931 (age 61) and 1935(age 57) were compared to those of workers born between 1937(age 55) and 1941 (age 51). Mean OHSCS scores are shown in Table 11. A t-test showed no significant difference ($p < .05$) in OHSCS mean scores for the older (21.53) and younger (21.21) groups. Moreover, a review of t-test results on the nine variables comprising the OHSCS showed no significant difference in the mean responses of the older and younger groups on any item.

Gender. OHSCS scores of 747 male and 245 female skilled craft workers were compared. Mean OHSCS scores are shown in Table 12. A t-test showed there was a small significant difference ($p < .05$) in OHSCS mean scores between males (21.56) and females (20.67), indicating that females assessed their jobs as having more negative impact on health and safety than males.



NOTE:

Score 9 = N = 1	Score 23 = N = 81
Score 10 = N = 1	Score 24 = N = 69
Score 11 = N = 3	Score 25 = N = 79
Score 12 = N = 11	Score 26 = N = 49
Score 13 = N = 5	Score 27 = N = 33
Score 14 = N = 27	Score 28 = N = 24
Score 15 = N = 29	Score 29 = N = 13
Score 16 = N = 31	Score 30 = N = 8
Score 17 = N = 44	Score 31 = N = 4
Score 18 = N = 62	Score 32 = N = 1
Score 19 = N = 67	Score 33 = N = 0
Score 20 = N = 84	Score 34 = N = 0
Score 21 = N = 87	Score 35 = N = 0
Score 22 = N = 71	Score 36 = N = 0

Figure 11. Distribution of Skilled Craft Worker Scores on the Overall Occupational Health and Safety Climate Scale

Table 11. Comparison of Skilled Craft Worker Scores on the Overall Occupational Health and Safety Climate Scale by Age Group

Worker Sample	N	Mean	Std. Dev.	Std. Error	Min.	Max.	df	t	p
Older	375	21.53	4.00	0.21	10	32	882	1.17	NS
Younger	509	21.21	4.04	0.18	9	31			

$t_{.05} = 1.96$

Table 12. Comparison of Skilled Craft Worker Scores on the Overall Occupational Health and Safety Climate Scale by Gender

Worker Sample	N	Mean	Std. Dev.	Std. Error	Min.	Max.	df	t	p
Female	245	20.67	3.86	0.25	10	31	990	-3.03	$p<.05$
Male	747	21.56	4.04	0.15	9	32			

$t_{.05} = 1.96$

A review of t-test results on the nine items comprising the OHSCS showed significant differences ($p < .05$) in the responses of male and female skilled craft workers on six variables. Table 13 shows that males (mean 2.80) assessed their jobs to require the lifting of heavy loads (Variable 3302) significantly more often ($p < .05$) than females (mean 3.24). Table 14 shows that males (mean 2.39) assessed their jobs to require working in an awkward position, e.g., stooping, kneeling, or crouching (Variable 3303), significantly more often ($p < .05$) than females (mean 3.12). Table 15 shows that females (mean 1.42) assessed their jobs to require good eyesight (Variable 3304) significantly more often ($p < .05$) than males (mean 1.61). Table 16 shows that females (mean 2.26) assessed their jobs to require keeping up with a pace set by others (Variable 3309) significantly more often ($p < .05$) than males (mean 2.63). Table 17 shows that females (mean 1.42) assessed their jobs to require repetitious work (Variable 3310) significantly more often ($p < .05$) then males (mean 2.24). Table 18 shows that males (mean 2.77, reverse score) assessed their jobs to allow them freedom to decide how to do their work (Variable 3312) significantly more often ($p < .05$) than females (mean 2.22, reverse score).

Race. OHSCS scores of Caucasian, Black, and Latino skilled craft workers were compared. Table 19 presents the means and related data of each racial group. Table 20 shows the results of the F-test of variance between each pair of samples. There was adequate evidence to support the assumption of equal variance ($p < .05$).

Table 13. Comparison of Male and Female Skilled Craft Worker Scores for Lifting Heavy Loads (Variable 3302)

Worker Sample	N	Mean	Std. Dev.	Std. Error	Min.	Max.	df	t	p
Female	245	3.24	0.93	0.06	1	4	990	6.04	$p<.05$
Male	747	2.80	1.00	0.04	1	4			

$t_{.05} = 1.96$

Table 14. Comparison of Male and Female Skilled Craft Worker Scores for Working in Awkward Positions (Variable 3303)

Worker Sample	N	Mean	Std. Dev.	Std. Error	Min.	Max.	df	t	p
Female	245	3.12	1.00	0.06	1	4	990	10.01	$p<.05$
Male	747	2.39	0.99	0.04	1	4			

$t_{.05} = 1.96$

Table 15. Comparison of Male and Female Skilled Craft Worker Scores for Eyesight (Variable 3304)

Worker Sample	N	Mean	Std. Dev.	Std. Error	Min.	Max.	df	t	p
Female	245	1.42	0.68	0.04	1	4	990	-3.73	$p<.05$
Male	747	1.61	0.71	0.03	1	4			

$t_{.05} = 1.96$

Table 16. Comparison of Male and Female Skilled Craft Worker Scores for Pace (Variable 3309)

Worker Sample	N	Mean	Std. Dev.	Std. Error	Min.	Max.	df	t	p
Female	245	2.26	1.24	0.08	1	4	990	-4.29	$p<.05$
Male	747	2.63	1.16	0.04	1	4			

$t_{.05} = 1.96$

Table 17. Comparison of Male and Female Skilled Craft Worker Scores for Repetition (Variable 3310)

Worker Sample	N	Mean	Std. Dev.	Std. Error	Min.	Max.	df	t	p
Female	245	1.42	0.76	0.05	1	4	587.4	-13.21	$p < .05$
Male	747	2.24	1.07	0.04	1	4			

$t_{.05} = 1.96$

Table 18. Comparison of Male and Female Skilled Craft Worker Scores for Helpful Co-workers (Variable 3312)

Worker Sample	N	Mean	Std. Dev.	Std. Error	Min.	Max.	df	t	p
Female	245	2.22	1.19	0.08	1	4	372.1	-6.52	$p < .05$
Male	747	2.77	1.03	0.04	1	4			

$t_{.05} = 1.96$

Table 19. Summary of Skilled Craft Worker Scores on the Overall Occupational Health and Safety Climate Scale by Race

Race	N	Mean	Standard Deviation	Range	
				Minimum	Maximum
Black	175	21.27	4.13	10	31
Caucasian	675	21.52	3.98	9	32
Latino	118	20.52	4.01	12	31

Table 20. F-Test of the Difference Between Variances of Skilled Craft Worker Scores on the Overall Occupational Health and Safety Climate Scale by Race

Races	df	F	$F_{.05}$
Black, Caucasian	174,674	1.08	1.20
Black, Latino	174,117	1.06	1.36
Caucasian, Latino	674,117	1.02	1.40

As indicated in Table 21, analysis of variance (ANOVA) showed a significant difference ($p < .05$) in the mean scores among the three groups. The Scheffé test (Table 22) showed a significant difference ($p < .05$) between the mean scores of Caucasians (21.52) and Latinos (20.52) but not between any other groups. When compared to Caucasians, Latinos assessed that overall their jobs had a higher frequency of characteristics with negative impact on occupational health and safety climate.

Union affiliation. OHSCS scores of 441 skilled craft workers who were members of labor unions and 551 non-members of labor unions were compared. Mean OHSCS scores are shown in Table 23. A review of t-test results showed no significant difference in the mean responses of union and non-union members. A review of t-test results on the nine items comprising the OHSCS showed no significant difference in the mean responses of union and non-union workers on any variable.

Assessment of Willingness to Accommodate Scale Scores

Research Question No. 3: **How do skilled craft workers perceive their employers' willingness to accommodate older employees as compared to workers in other job classifications ?**

Scores from the six Likert-type items that comprised the Willingness to Accommodate Scale (WAS) were used to address Research Question No. 3. These items elicited worker perceptions about the willingness of employers to accommodate older workers who needed accommodation. Each of the items asked participants to respond on a scale of 1 (strongly agree) to 4 (strongly disagree). Possible WAS scores ranged between

Table 21. ANOVA of Skilled Craft Worker Mean Scores on the Overall Occupational Health and Safety Climate Scale by Race

Source	df	Sum of Squares	Mean Square	F
Between Groups	2	1.28	0.64	3.21
Within Groups	965	191.64	0.20	--
Total	967	192.91	--	--

$F_{.05}=3.01$

Table 22. Scheffé Multiple Comparison Test for Skilled Craft Worker Scores on the Overall Occupational Health and Safety Climate Scale by Race

Races	Means (by Item)	Lower Confidence Limit	Difference Between Means	Upper Confidence Limit
Black, Caucasian	2.36, 2.39	-0.120	-0.03	0.065
Black, Latino	2.36, 2.28	-0.045	0.08	0.214
Caucasian, Latino	2.39, 2.28*	0.002	0.11	0.221

* Significant ($p < .05$)

Table 23. Comparison of Skilled Craft Worker Scores on the Overall Occupational Health and Safety Climate Scale by Status of Union Membership

Worker Sample	N	Mean	Std. Dev.	Std. Error	Min.	Max.	df	t	p
Union	441	21.23	4.03	0.19	9	32	990	-0.81	NS
Non Union	551	21.44	4.00	0.17	10	31			

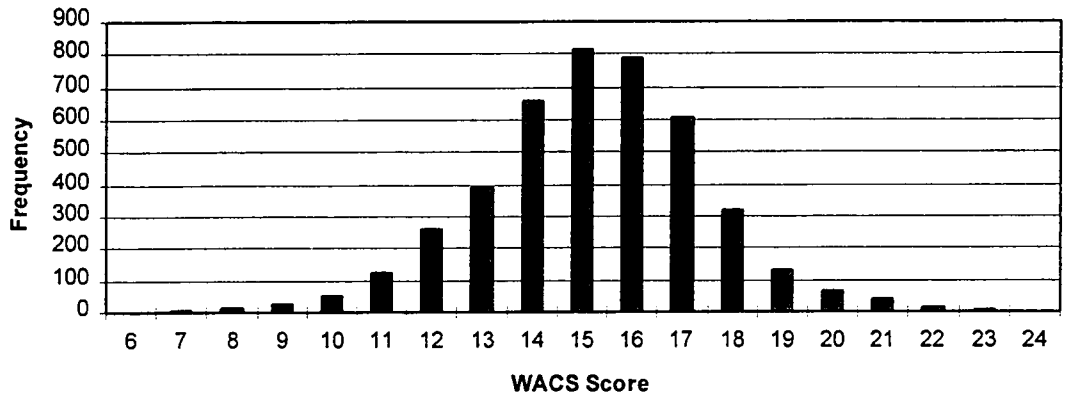
$t_{.05} = 1.96$

6 (the lowest score possible) and 24 (the highest score possible). Figure 12 shows the distribution of the 4,325 WAS scores. (Note: 177 of the 4502 workers did not respond to one or more of the WAS items; all responses of these workers were excluded in the assessment of WAS scores.) The mode was 15. The mean was 15.19 and the standard deviation was 2.26. Scores ranged from 6 to 23. The distribution was relatively normal around the mean.

The independent variable for Research Question No. 3 was classification of worker (skilled craft worker and all other workers). This variable was used to determine if there were significant differences between the scores of skilled craft workers and other workers on the WAS and on each of the six items that comprised the WAS.

Mean WAS scores of each worker group and mean scores of each of its six items are shown in Tables 24 through 30. Prior to conducting t-tests for significance of difference in each pair of means, an F' statistic was calculated to determine if the homogeneity of variance assumption was violated. For variables 3324 and 3325, the p-value of the F' statistic was less than 0.05. For these variables, the approximate t-statistic was used to account for inequality of variance. For the overall WAS and variables 3326, 3314, 3315, and 3317, the p-value of the F' statistic exceeded 0.05 and the exact t-statistic for equal variances was used.

As shown in Table 24, a two-tailed t-test showed no significant difference in the means (15.07, 15.23) of skilled craft and other worker job classifications on the overall WAS. A review of t-test results for the six items comprising the WAS showed significant differences ($p < .05$) in four variables. Table 25 shows that skilled craft workers had a



NOTE:
Score 6 = N = 3
Score 7 = N = 4
Score 8 = N = 14
Score 9 = N = 29
Score 10 = N = 55
Score 11 = N = 126
Score 12 = N = 260
Score 13 = N = 389
Score 14 = N = 660
Score 15 = N = 815
Score 16 = N = 788
Score 17 = N = 609
Score 18 = N = 320
Score 19 = N = 129
Score 20 = N = 68
Score 21 = N = 38
Score 22 = N = 12
Score 23 = N = 6
Score 24 = N = 0

Total = N = 4325

Figure 12. Distribution of Scores on the Overall Willingness to Accommodate Scale

Table 24. Comparison of Scores on the Overall Willingness to Accommodate Scale by Job Classification

Worker Sample	N	Mean	Std. Dev.	Std. Error	Min.	Max.	df	t	p
Other	3369	15.23	2.29	0.04	6	23	4323	1.95	$p<.05$
Skilled	956	15.07	2.19	0.07	6	23			

$t_{.05} = 1.96$

Table 25. Comparison of Skilled Craft Worker and Other Worker Scores for Giving Younger People Job Preference (Variable 3324)

Worker Sample	N	Mean	Std. Dev.	Std. Error	Min.	Max.	df	t	p
Other	3369	2.96	0.66	0.01	1	4	1644.6	5.12	$p<.05$
Skilled	956	2.84	0.61	0.02	1	4			

$t_{.05} = 1.96$

Table 26. Comparison of Skilled Craft Worker and Other Worker Scores for Pressure to Retire Early (Variable 3325)

Worker Sample	N	Mean	Std. Dev.	Std. Error	Min.	Max.	df	t	p
Other	3369	3.02	0.63	0.01	1	4	1469.3	10.37	$p<.05$
Skilled	956	2.77	0.67	0.02	1	4			

$t_{.05} = 1.96$

Table 27. Comparison of Skilled Craft Worker and Other Worker Scores for Job Flexibility (Variable 3326)

Worker Sample	N	Mean	Std. Dev.	Std. Error	Min.	Max.	df	t	p
Other	3369	2.25	0.68	0.01	1	4	4323	0.10	NS
Skilled	956	2.24	0.65	0.02	1	4			

$t_{.05} = 1.96$

Table 28. Comparison of Skilled Craft Worker and Other Worker Scores for Training (Variable 3314)

Worker Sample	N	Mean	Std. Dev.	Std. Error	Min.	Max.	df	t	p
Other	3369	2.21	0.82	0.01	1	4	4323	2.24	$p<.05$
Skilled	956	2.24	0.85	0.03	1	4			

$t_{.05} = 1.96$

Table 29. Comparison of Skilled Craft Worker and Other Worker Scores for Job Difficulty (Variable 3315)

Worker Sample	N	Mean	Std. Dev.	Std. Error	Min.	Max.	df	t	p
Other	3369	2.37	0.78	0.01	1	4	4323	-1.19	NS
Skilled	956	2.40	0.77	0.02	1	4			

$t_{.05} = 1.96$

Table 30. Comparison of Skilled Craft Worker and Other Worker Scores for Job Stress (Variable 3317)

Worker Sample	N	Mean	Std. Dev.	Std. Error	Min.	Max.	df	t	p
Other	3369	2.12	0.79	0.01	1	4	4323	-8.39	$p<.05$
Skilled	956	2.36	0.76	0.02	1	4			

$t_{.05} = 1.96$

significantly ($p < .05$) stronger perception (mean 2.84 versus mean 2.96) than other workers that their employers give younger people promotion preference (Variable 3324). Table 26 shows that skilled craft workers had a significantly ($p < .05$) stronger perception (mean 2.77 versus mean 3.02) than other workers that their co-workers make older workers feel that they ought to retire before age 65 (Variable 3325). Table 28 shows that skilled craft workers had a significantly ($p < .05$) weaker perception (mean 2.24 versus mean 2.21) than other workers that they could do their jobs better with updated skills training (Variable 3314). Table 30 shows that skilled craft workers had a significantly ($p < .05$) weaker perception (mean 2.36 versus mean 2.12) than other workers that they had job stress (Variable 3317).

There were no significant differences in the mean responses of skilled craft and other workers on two items. An examination of Table 27 shows that both groups of workers perceived (means 2.25, 2.24 reverse scores) their employers to be unlikely to let older workers move to a less demanding job with less pay if they wanted to (Variable 3326). Table 29 shows that both groups of workers perceived (means 2.37, 2.40) their jobs to require them to do more difficult things than they used to (Variable 3315).

Standard Error

For all OHSCS and WAS variables, the standard error of the sample mean was very small, indicating that the mean of the sample closely approximated the mean of the population from which it was selected. Standard error values are presented in the tables corresponding to the applicable t-tests.

Summary

Chapter 4 provided analyses of the data used in this study. The data were collected from 4,502 persons who participated in the Health and Retirement Study and who worked full-time for someone else. Using variables from the HRS survey questionnaire, two scales were developed to answer the research questions. Skilled craft worker assessments of occupational health and safety climate were compared with assessments of other workers. Within the category of skilled craft workers, assessments of occupational health and safety climate were compared by age, gender, race, and union affiliation. Table 31 presents a summary of mean scores on the OHSCS. Skilled craft worker perceptions of employer willingness to accommodate older workers were compared with perceptions of other workers.

Following tabulation and loading in the SAS® statistical program, descriptive statistics were used to analyze the data. Means were calculated and analyzed using t-tests and analysis of variance (ANOVA). In Chapter 5, the analyses of Chapter 4 are used to determine the findings and conclusions from this study.

Table 31. Summary of Scores on the Overall Occupational Health and Safety Climate Scale by Worker Classification

Worker Classification	N	Mean	Std.Dev.
Other Workers	3510	23.20	4.05
Skilled Workers	992	21.34	4.01
Younger (51-55)	509	21.21	4.04
Older (57-61)	375	21.53	4.00
Male	747	21.56	4.04
Female	245	20.67	3.86
Black	175	21.27	4.13
Caucasian	675	21.52	3.98
Latino	118	20.52	4.01
Union Member	441	21.23	4.03
Non-Union Member	551	21.44	4.00

CHAPTER V

SUMMARY, FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

Summary

This research was conducted for the purpose of evaluating differences between skilled craft workers' and other workers' (1) assessments of job characteristics important to occupational health and safety, and (2) perceptions of employer willingness to accommodate older employees with declining work capacity. The problem associated with the purpose of this study was to determine if differences existed in perceptions of elements of occupational health and safety climate among workers in different job classifications .

Findings

The following findings are based on the analysis of data presented in Chapter 4:

Research Question No. 1

How do skilled craft workers assess the health and safety of their work places as compared to workers in other job classifications?

Research Question No. 1 Findings

1. Scores of skilled craft workers and other workers differed significantly ($p < .05$) on the occupational health and safety climate scale. Skilled workers assessed their jobs as having a more negative health and safety climate.

2. Skilled craft workers and other workers differed significantly ($p < .05$) in their assessment of the frequency that their jobs required physical effort. Skilled workers assessed their jobs as requiring significantly more physical effort.

3. Skilled craft workers and other workers differed significantly ($p < .05$) in their assessment of the frequency that their jobs required heavy lifting. Skilled workers assessed their jobs as requiring significantly more heavy lifting.

4. Skilled craft workers and other workers differed significantly ($p < .05$) in their assessment of the frequency that their jobs required working in stooping, kneeling, and crouching positions. Skilled workers assessed their jobs as requiring significantly more work in awkward positions.

5. Skilled craft workers and other workers differed significantly ($p < .05$) in their assessment of the frequency that they had to keep up with a pace set by others. Skilled workers assessed their jobs to have significantly less pressure to keep pace with their cohorts.

6. Skilled craft workers and other workers differed significantly ($p < .05$) in their assessment of the frequency that they had freedom to decide how to do their work. Skilled workers assessed that they have significantly less freedom to decide how to do their work.

7. Skilled craft workers and other workers differed significantly ($p < .05$) in their assessment of the frequency that they worked with helpful and friendly people. Skilled workers assessed their jobs as working significantly less often with helpful and friendly people.

8. There was no significant difference between skilled craft workers' and other workers' assessments of the frequency that their jobs required good eyesight, intense concentration, or repetitiveness.

Research Question No. 2

How do skilled craft workers in the following subgroups assess the health and safety of their work places:

a. older (57-61 years) and less old (51-55 years),

b. male and female,

c. Black, Caucasian, and Latino, and

d. union members and non-union members?

Research Question No. 2 Findings

1. There was no significant difference between scores of skilled craft workers aged 51-55 years and skilled craft workers aged 56-61 years on the occupational health and safety climate scale.

2. There was no significant difference between skilled craft workers aged 51-55 years and skilled craft workers aged 56-61 years in their assessment of the frequency that their jobs required physical effort, lifting heavy loads, working in awkward positions, good eyesight, intense concentration,

keeping up with a pace set by others, repetitiveness, freedom to decide how to do their work, or working with friendly and helpful people.

3. Scores of male and female skilled craft workers differed significantly ($p < .05$) on the occupational health and safety climate scale. Females workers assessed their jobs as having a more negative health and safety climate than did their male counterparts.

4. Male and female skilled craft workers differed significantly ($p < .05$) in their assessment of the frequency that their jobs required heavy lifting. Male workers assessed their jobs as requiring heavy lifting significantly more often than did their female counterparts.

5. Male and female skilled craft workers differed significantly ($p < .05$) in their assessment of the frequency that their jobs required working in stooping, kneeling, and crouching positions. Male workers assessed their jobs as requiring work in these awkward positions significantly more often than did their female counterparts.

6. Male and female skilled craft workers differed significantly ($p < .05$) in their assessment of the frequency that their jobs required good eyesight. Female workers assessed their jobs to require good eyesight significantly more often than did their male counterparts.

7. Male and female skilled craft workers differed significantly ($p < .05$) in their assessment of the frequency that they had to do repetitious work. Female workers assessed their jobs to require significantly more repetition

than did their male counterparts.

8. Male and female skilled craft workers differed significantly ($p < .05$) in their assessment of the frequency that they had to keep up with a pace set by others. Female workers assessed their jobs to require keeping up with a pace set by others significantly more often than did their male counterparts.

9. Male and female skilled craft workers differed significantly ($p < .05$) in their assessment of the frequency that they had freedom to decide how to do their work. Male workers assessed their jobs to have significantly more freedom to decide than did their female counterparts.

10. There was a significant difference ($p < .05$) between the scores of Caucasian and Latino skilled craft workers on the occupational health and safety climate scale. Latino workers assessed their jobs as having a more negative health and safety climate.

11. There was no significant difference between the scores of Black and Caucasian or between Black and Latino skilled craft workers on the occupational health and safety climate scale.

12. There was no significant difference between scores of skilled craft workers belonging to unions and those not belonging to unions on the occupational health and safety climate scale.

13. There was no significant difference between skilled craft workers who were members of unions and those who were not members of unions in their assessment of the frequency that their jobs required physical effort, lifting heavy loads, working in awkward positions, good eyesight, intense concentration, keeping up with a pace set by others, repetitiveness, freedom to decide how to do their work, or working with friendly and helpful people.

Research Question No. 3

How do skilled craft workers perceive their employers' willingness to accommodate older employees as compared to workers in other job classifications ?

Research Question No. 3 Findings

1. There was no significant difference between scores of skilled craft workers and other workers on the willingness to accommodate scale.
2. There was a significant difference ($p < .05$) in skilled craft and other worker perceptions of promotion preference. Skilled workers had a significantly stronger perception that their employers gave younger people promotion preference.
3. Skilled craft workers and other workers differed significantly ($p < .05$) in their perceptions of co-workers who made older workers feel that they ought to retire early. Skilled workers had a significantly stronger perception that their co-workers made older workers feel that they ought to retire before age 65.

4. Skilled craft workers and other workers differed significantly ($p < .05$) in their perceptions of job stress. Skilled workers perceived their jobs to have significantly less stress.

5. Skilled craft workers and other workers differed significantly ($p < .05$) in their perceptions that they could do their job a lot better with skills training. Skilled workers perceived significantly less need for updating of their job skills.

Conclusions

Within the limitations of this study, analysis of the data, and findings, it was concluded that:

1. Older skilled craft workers assessed their jobs as having a higher overall frequency of characteristics associated with a negative health and safety climate than did workers in other job classifications.

2. There was no significant difference in the overall assessment of the frequency of characteristics associated with a negative health and safety climate by skilled craft workers aged 51-55 years and those aged 57-61 years.

3. Older female skilled craft workers assessed their jobs as having a higher overall frequency of characteristics associated with a negative health and safety climate than did men.

4. Older Latino skilled craft workers assessed their jobs as having a higher overall frequency of characteristics associated with a negative health and safety climate than did Caucasians. There was no significant difference between Blacks and Caucasians, or between Blacks and Latinos, in their overall assessment of the frequency of characteristics associated with a negative health and safety climate.
5. There was no significant difference in the overall assessment of the frequency of characteristics associated with a negative health and safety climate by skilled craft workers who were union members and those who were not union members.
6. There was no significant difference in overall perceptions of employer willingness to accommodate the needs of older workers by older skilled craft workers and older workers in other job classifications.

Recommendations

The following recommendations for further study are based on the findings and conclusions presented in this chapter:

1. Due to the broadness of occupations in the "other" category, a study similar to this study should be conducted using HRS data from selected subgroups in the "other" category (e.g., health services, farming, and handlers).

2. Due to the broadness of occupations in the "skilled" category, a study similar to this study should be conducted using masked HRS data on selected subgroups of skilled occupations (e.g., machinists, welders, and electricians).

3. The magnitude of differences in the responses of male and female workers merits a separate study to determine the reasons.

4. The perception by all categories of older workers that their employers would be unlikely to let an older worker move to a less demanding job with less pay merits evaluation by employers and a separate study of employers to determine the reasons.

5. The assessment by all categories of older workers that their jobs require good eyesight almost all the time merits study of workplaces to determine if appropriate lighting exists for older workers with declining vision.

6. The assessment by all categories of older workers that their jobs require them to do repetitive work and over merits study of workplaces to identify opportunities for job enrichment.

7. Safety and health practitioners should develop specific guidelines to better assess the needs of older workers.

8. Safety and health practitioners and managers should evaluate and develop appropriate training for managers on the perceived impact of the work environment by older workers.

9. Employers in the United States, especially those that employ skilled craft workers, should begin now to evaluate how to best integrate older workers into mainstream business activities and learn how to accommodate the increasingly aging workforce.

10. Research to compare the assessment of health and safety climate by younger workers (e.g., 20-35 years) with older workers is needed to provide information on how age affects perceptions of occupational health and safety. Due to restrictions imposed by using data provided by the HRS, only responses from workers aged 51 to 61 years could be analyzed.

CHAPTER VI

THE STUDY IN RETROSPECT

This concluding chapter covers elements of the study not fully supported by the data, but which are important nonetheless. For much of the past 50 years, American public and business policy has been focused on ensuring older people have a comfortable retirement. Government officials made it relatively easy for persons to collect Social Security payments far beyond their corresponding contributions to the system. Labor unions negotiated retirement payments to supplement Social Security for represented members. Early retirement options, pension buyouts, and retirement incentives successfully enticed many healthy workers into a more leisurely life of full or partial retirement. Only in the past few years have governments realized that the pendulum may have swung too far towards early retirement. Facing shortages of workers, especially in skilled craft occupations, efforts are now needed to retain the very workers who have been purged from the workplace in previous years.

Although governments, including the United States, are beginning to recognize the consequences (and costs) of not reversing early retirement trends, the business community has been slower. Downsizing in the world economy of the 1990s and the relatively small numbers of older workers in the workforce during the second half of the 20th century are two of the reasons business has not actively investigated methods of retaining older workers.

The Health and Retirement Study is the only major study of pre-retirement workers conducted in the last 20 years. Although a major project that has received substantial federal funding, there is relatively little recognition of the HRS by business. For example, there have been no articles about the meaning of the study to safety practitioners in *Professional Safety*, the journal of the American Society of Safety Engineers. The message to reevaluate workplace health and safety for the aging workforce is not being communicated to those practicing safety and health professionals who can use HRS results to reevaluate corporate policies that affect older workers.

This study compared perceptions of two general job classifications: skilled craft workers and all other workers (Figure 1). Several of the occupations in the "other" classification were managerial, professional or clerical (Figure 5) with generally less hazardous working conditions than skilled craft workers. For this reason, a lower overall assessment of the occupational health and safety climate and higher assessments of physical effort and lifting of heavy loads, among others, by skilled craft workers was not entirely unexpected. However, these findings serve to remind management and health and safety professionals that workers in different occupations within the same company may need separate health and safety programs. These findings are consistent with those of Coyle, Sleeman and Adams (1995) who found significant differences in the assessment of safety climate by workers in two similar divisions of the same company.

There was no significant difference in the assessment of overall health and safety climate by older (57 to 61 years) and less-old (51 to 55 years) skilled craft workers. Further, there was no significant difference between these workers in their assessment of

heavy lifting, physical effort, or working in awkward positions. If older workers were being accommodated for age-related decline of work capacity, the self-assessments of the older group might be expected to show less physical effort, lifting, and work in awkward positions. These findings suggest that employers may not be sufficiently differentiating the job assignments of workers approaching retirement. Failure to accommodate older workers who need accommodation due to physical or other limitations may partly explain the attrition of workers as they age (Figure 7). These findings complement the research results of Gustman and Steinmeier (1986) who found workers decrease their participation in physically demanding jobs as they age.

Some of the most interesting differences reported in this study were between male and female skilled craft workers. Responses to variables concerning the frequency of heavy lifting and work in awkward positions (Variables 3302 and 3303) indicate that males may be doing more heavy and difficult jobs than females. Responses to variables concerning repetition and job freedom (Variables 3310 and 3312) indicate that female skilled craft workers, within an occupation, may be performing those mundane and restrictive jobs found undesirable by their male counterparts. Responses to the variable concerning eyesight (Variable 3304) indicate that females may be performing more intricate job tasks than their male counterparts. Females also assessed their jobs to have more pressure than males to keep up with a pace set by others (Variable 3309). As a whole, the responses of females to variables in the OHSCS may indicate females are not yet performing all the tasks of the typical male skilled craft worker in this historically male-dominated job classification. Responses also suggest that the health and safety hazards experienced by

male and female skilled craft workers are not the same and may need separate attention by health and safety professionals in the workplace.

The only significant difference in assessment of occupational health and safety by race of skilled craft workers was between Caucasians and Latinos, and that difference was small (OHSCS mean scores were 21.52 for Caucasians and 20.51 for Latinos). Latinos, who were concentrated geographically in the southern and southwestern regions of the United States, and in large metropolitan areas, may assess their safety and health climate slightly more negatively than whites because they are willing to accept employment conditions found undesirable by established Caucasian workers. However, the lack of research on Latinos (HRS, 1995) makes any such explanation highly speculative.

A surprising finding in this study was the lack of difference in OHSCS responses by union and non-union skilled craft workers. Not only was there no difference in scores on the overall OHSCS, there was no difference in any of the nine variables (e.g., physical effort, heavy lifting, pace, and job freedom) comprising the OHSCS. Because unions have given workplace safety high visibility and have championed safety improvements for represented workers in the past, a higher assessment of occupational health and safety climate by union versus non-union members might have been expected. The results of this study suggested that there were no significant perceived differences in the health and safety climates of union and non-union workplaces.

Neither skilled craft nor other workers perceived that their employers were likely to let older workers move to a less demanding job, even with a pay cut (Variable 3326). These data may suggest that older workers believed their employers were interested in

retaining them only as long as they could perform their career jobs, but were not interested in helping them stay around in a less demanding position. Such a perception is not inconsistent with another report (American Association of Retired Persons & the Society for Human Resource Management, 1993) that found most employers did not see a need to take actions to retain older workers.

Perceptions concerning preferential treatment of younger workers and pressure to retire early (Variables 3324 and 3325) may indicate more of a problem with ageism in skilled craft than in other work places. The significantly more negative perception that co-workers make older workers feel they should retire before age 65 may reflect physical demands of the skilled craft job classification. If a worker cannot perform physical requirements of the job, then another worker or workers may have to step in. If this occurs often, the involved co-workers may suggest that it is time for the older worker to leave the job, especially when there is no company policy that acknowledges the need to accommodate older workers.

Finally, during the conceptual phase of this study, consideration was given to surveying the skilled craft workers of a major government defense complex in the southeastern United States. The site was ideal for research because of the large numbers of skilled craft workers who were employed in a broad range of craft occupations. Efforts to obtain permission from the operating contractor to conduct the study failed after several months. The contractor claimed the research could be used against it by older workers who participated in the study, or by potential competitors who might use the results to gain a competitive edge in future government contract evaluations. As a result, access to a skilled

work force rich in older workers was denied. This lack of access was disappointing particularly because the site was funded completely by federal tax dollars, dollars appropriated by the same Congress that appropriated funds for the HRS.

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