Development of a Multidimensional Scale of Ergonomic Factors Related to Employee Retention

A thesis presented to

the faculty of

the Russ College of Engineering and Technology of Ohio University

In partial fulfillment

of the requirements for the degree

Master of Science

Tripura Vadlamani

November 2010

This thesis titled

Development of a Multidimensional Scale of Ergonomic Factors Related to Employee Retention

by

TRIPURA VADLAMANI

has been approved for

the Department of Industrial and Systems Engineering

and the Russ College of Engineering and Technology by

Diana J. Schwerha

Assistant Professor of Industrial and Systems Engineering

Dennis Irwin

Dean, Russ College of Engineering and Technology

ABSTRACT

VADLAMANI, TRIPURA, M.S., November 2010, Industrial and Systems Engineering

Development of a Multidimensional Scale of Ergonomic Factors Related to Employee Retention (134 pp.)

Director ofThesis: Diana J. Schwerha

According to Bureau of Labor Statistics, during the next decade the annual growth rate of the 55 year and above age group will be 4.1%, four times the rate of the overall workforce. Seventy-six million baby boomers are projected to retire in the next 30 years and only 46 million are entering the workforce. A need exists for the companies to overcome these labor shortages and the best way is to retain their older employees. Employee retention has been related to financial, social, health and job satisfaction factors. Although the presence of ergonomic factors has been linked to injury, limited research has been done in the past on the impact of ergonomic interventions on employee retention. The present study examined the various ergonomic risk factors related to physical and cognitive aspects of the job environment by conducting an employee retention survey. The relationship between the risk factors, tiredness, job satisfaction, age and intent to leave was explored. Results indicated that ergonomic factors predicted physical tiredness, job satisfaction and intent to leave.

Approved: _____

Diana J. Schwerha

Assistant Professor of Industrial and Systems Engineering

TABLE OF CONTENTS

Page

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1: INTRODUCTION

The labor workforce in the United States is facing a sharp decline as the baby boomers that comprise more than one quarter of the population are nearing their retirement (Dychtwald, Erickson & Morison, 2004). According to Bureau of Labor Statistics, during the next decade the annual growth rate of 55 year and above age group labor force will be 4.1%, four times the rate of the overall workforce (Toossi, 2004). As a major part of the older workforce retires, a need exists for companies to predict labor shortages and provide mechanisms to offset them. One of the most direct ways that a company can ensure an adequate labor pool is to retain their older employees.

Two million older workers in the age group of 50-74 years are projected to work even after retirement (Sullivan & Duplaga, 1997). Regardless of their willingness to continue working, many organizations do not hire older employees because of age-related issues (Hedge, Borman & Lammlein, 2006). They believe that the productivity of the employee declines with age and they can no longer cope with the technological trends when compared to younger employees who can quickly adapt to the new techniques (Coberly, 1983). Past research has demonstrated that this is a misconception and there is no critical difference in the performance of the two groups (Sullivan & Duplaga, 1997). Moreover, older employees are loyal, ethical, motivated and have higher levels of job satisfaction than the younger generation (Sullivan & Duplaga, 1997). In addition, by retaining their older workers, companies can reduce costs associated with hiring and training novice employees.

The factors that influence one's decision to quit or retire vary over a large scale ranging from health, financial status, employment opportunities to family commitments, job satisfaction and need for other activities in life (Shacklock & Brunetto, 2005). Many of these studies, however, have not considered the ergonomic factors that affect everyday work. Work factors, however, can contribute to employee health and employee satisfaction (Wilson, Dejoy, Vanderberg, Richardson & Mcgrath, 2004**).** The role of ergonomics has always been vital in preventing injuries and increasing the productivity of workers and its goal has always been a quality working life with concentration on the job environment, employee safety and health, and the productivity of the system (Kumashiro, 2000).

The present study documents the results of the job characteristics category of the employee retention survey conducted with two large organizations. The purpose of this research is to develop a scale of key job characteristics (physical and psychosocial) that relate to physical and mental tiredness and intent to leave by conducting an exploratory and a confirmatory factor analysis. Also, a regression analysis is conducted to determine role of the ergonomic risk factors and age in predicting our measured variables i.e. tiredness, job satisfaction and intent to leave.

Problem Statement

There has been little research done in the past which was directed towards the effect of work factors on the physical and mental tiredness, resulting in poor health and hence leaving the organization. This study attempts to look at the effects of various job

characteristics of a sample of the population in multiple professions on their intentions to leave. The objectives of the research are as follows:

1. Develop a measure of risk factors related to physical and work organizational job environment by conducting an exploratory and a confirmatory factor analysis.

2. Determine the relationship between these work factors and physical tiredness, mental tiredness, job satisfaction and intent to leave.

3. Determine the role of age on one's intentions to leave.

CHAPTER 2: LITERATURE REVIEW

Demographics of Baby Boomers

According to US Census 2003, the proportion of people aged 65 comprised of 12.4% of the population and this will rise to 20.3 % by 2035 (Patrick & Whitman, 2006). As the population is aging, the number of people leaving the workforce due to various reasons is increasing. According to Bureau of Labor Statistics, 19 million people left the workforce last (Dohm, 2000). By 2014, the baby boomers will be in the age group of 50-68 and with the passing of every year, they group into the cohort of people approaching retirement (Toossi, 2005). Seventy-six million people are projected to retire over the next 30 years and only 46 million Generation X people (born between 1964 – 1980) will be in the workforce (Eisenburg, 2000). The proportion of younger workers entering the workforce is projected to gradually decrease due to the decline in fertility rates which dropped to 2.04 in 1998 from 3.06 in 1960 and is expected to drop further to 1.90 by 2025 (Piktialis & Morgan, 2003). Thus, looking at the baby boomers aging trends a drastic shortage of employees in the workforce is expected. Brown (2002) stated that a few economists even believe that this issue will be the "transcendent economic and political issue of the century" (as cited in Inman & Inman, 2004, p. 2).

According to a study conducted by the AARP in 1998, it was found that nearly 80% of baby boomers want to continue in the workforce even after retirement and only 16% tend to retire permanently from the workforce (Van Yoder & Goldberg, 2002). Improved financial status, economic growth and government revenue are the main reasons for their prolonged careers (Mermin, Johnson & Murphy, 2007). In a study by

Garnitz (2002), the AARP report stated that baby boomers continue working due to "part ego fulfillment, part economic, part the social support that work provides and part continuing to make contribution." Most of the baby boomers who want to continue working may not intend to continue in their current full-time jobs (Piktialis & Morgan, 2003). Dychtwald, Erickson & Morison (2004) in their study on retirement stated that "Most baby boomers want to continue working - and they may need to, for financial reasons - but they may not want to work for you." They might be working part-time or with the skills and talent they acquired all these years, they might resort to self employment (Dychtwald, Erickson & Morison, 2004). Also, when an experienced employee quits and joins another firm, it's a big loss to the company and its loss is a gain to the competitor firm.

According to a survey conducted by the Society for Human Resource Management, even with the availability of older workers choosing to stay in the workforce, more than half of the U.S employees do not take active measures to retain their aging employees and nearly two-thirds of them do not recruit aged employees (Dychtwald, Erickson & Morison, 2004). A study by the AARP in 1998 showed that even though 55% of American companies identified the importance of retaining of elder workforce, only 29% implemented strategies and procedures for baby boomer retention (Sullivan & Duplaga, 1997). To name a few, companies like CVS, Dress Barn, Aerospace Corporation etc. have initiated measures of honoring the older employees (Piktialis & Morgan, 2003). The CVS chain of pharmacies identified this problem approximately twelve years ago and started hiring older employees. The management

with the help of National Society of Aging advertised about their recruiting process to employ skilled and talented older workers (Dychtwald, Erickson & Morison, 2004). The Dress Barn offers flexible working schedules to its aged employees and Aerospace Corporation offers phased retirement programs (Piktialis & Morgan, 2003). Thus, these companies have found means for retaining their experienced employees and also discovered the reliability and productivity in their older employees. More companies could take the initiatives to implement strategies to retain their older employees, reduce turnover and contribute to overall economy.

Consequences of Older Worker Shortage

With the exit of the older workforce it is not just the shortage of the labor, but there exists a dearth in skill, knowledge and experience (Dychtwald, Erickson & Morison, 2004). Losing valuable experienced employees would undermine the company's organizational strategies, expertise in product development and improvements (Mermin, Johnson & Murphy, 2007). Older workers are well versed with customer needs, have tacit knowledge about companies past success and failures and loss of these experienced employees would hinder company's growth opportunities in the market (Piktialis & Morgan, 2003). Older workers are more loyal, ethical, flexible, motivated and self satisfied in their jobs (Sullivan & Duplaga, 1997). Moreover, studies have shown that job performance does not decline with age and older workers work in par with the younger workers (Doering, Rhodes & Schuster, 1983; Waldman & Avolio, 1986). It is also a myth that older workers are difficult to train (Allen & Hart, 1998). Frost (2002)

termed the older worker force as traditionalists who are dedicated and are comfortable working with a top down management approach.

The time and costs incurred on replacing these experienced employees are very high. The cost of recruiting, hiring and training new employees is calculated to be 150% of a retiree's annual salary (Izzo & Withers, 2002). This means that it costs almost $75,000 to replace an employee who was paid $50,000 (Van Yoder & Goldberg, 2002). Research indicates that the total employee turnover cost for a company could be 40% of their annual profits (Kniss, 2005). On an average with the resignation of 10 managerial employees, a company loses approximately $1 million (Fitz-enz, 1997; Ramlall, 2003).

Dohm (2000) researched on the predicted vacancy in various occupations and industries due to the retirement of the baby boomers. Educational services, public administration and health service may be the most affected with the exit of baby boomers. In health care, registered nurses and licensed practical nurses are the two professions where people are expected to leave in large numbers. This is a significant finding in the context that present research aims to measure retention trends in a healthcare organization.

Employee Turnover and Factors Affecting It

According to the definition given by Frank, Finnegan & Taylor (2004) employee turnover is the "unplanned loss of workers who voluntarily leave and whom employers would prefer to keep." PricewaterhouseCoopers (2004) stated that "Today, employee retention has become the major concern of every fast growing company and the priority

issue to be tackled" (as cited in Frank, Finnegan & Taylor, 2004, p.13). Many research studies have been done on the factors that affect a person's intention to quit. According to a model developed by Mobley (1977), intent to leave is a series of processes starting from job dissatisfaction to the thoughts of quitting, looking for alternate employment opportunities and finally the decision to quit. Hom, Caranikas-Walker, Prussia & Griffeth (1992) reexamined this model by applying meta analysis and structural equation modeling and found it to be valid with all the relationships being highly significant. Griffeth, Hom & Gaertner (2000) updated this meta analysis by re-reviewing it and found that the best predictors for the employee turnover to be job satisfaction, organizational commitment, job search, alternate job opportunities, withdrawal cognition and quit intentions. They also found that age, tenure, and nature of the job (physical and psychosocial aspects) are distal factors in the model of intention to quit.

Most of the studies showed that job satisfaction is a primary factor in the decision of quitting and there exists a negative a relationship between job satisfaction and intent to quit (Carsten & Spector, 1987; Tett & Meyer, 1993; Mobley, Griffeth, Hand & Meglino, 1979; Lambert, Hogan & Barton, 2001). According to Price (1997) job satisfaction is defined as "degree to which employees have a positive affective orientation towards employment by the organization" (as cited in Gaertner, 1999, p.479). Roznowoski & Hulin (1992, p.20) defined job satisfaction as the "most informative data a manager or a researcher can have for predicting employee behavior" (as cited in Lambert, Hogan & Barton, 2001, p. 234). Job dissatisfaction triggers a person's thoughts of quitting and leads to cost benefit analysis of the decision of quitting a job (Mobeley, Harmer &

Hollingsworth, 1978). In a study conducted by Hellman (1997), the relationship between job satisfaction and intent to leave was always found to be negative irrespective of the populations being a public or a private sector. The results of this study implied that "every unit of decrease of job satisfaction reflects approximately one-half standard deviation increase in intent to leave".

The effect of job satisfaction on intent to quit is moderated by demographic variables such as age, tenure and work environment factors (Lambert, Hogan & Barton, 2001). Rhodes (1983) in his literature research found that job satisfaction and age are positively correlated. Kacmar & Ferris (1989) stated that confidence and prestige increases with one's age and this leads to higher levels of job satisfaction. In their study on the relationship between age and job satisfaction while controlling the tenure variables, they found a curvilinear relationship between the two. Hellman (1997) implied that older people are less likely to leave their position and benefits from their accustomed jobs and compete with their younger counterparts in the job market. So their chances of staying in the job for longer periods are high. The results of the study conducted on job satisfaction and intent to leave by Hellman (1997) found that federal employees of age 49 and younger have higher possibilities to leave the organization than the older employees. In another study on the impact of job satisfaction on turnover intent by Lambert, Hogan & Barton (2001), it was found that as employee ages, their job satisfaction levels increase. There is always a natural positive correlation between age and tenure (Doering, Rhodes & Schuster, 1983; Gordon & Johnson, 1982). This leads to the fact that tenure has a positive relationship with job satisfaction. Hellman (1997) found that employees

with tenure less than 10 years are more likely to leave than their colleagues with tenure higher than 10 years. This is consistent with the past literature which implied that people in the early phase of their careers have high chances of moving between jobs in contrast to older employees who are well settled in their jobs (Hellman, 1997).

Alternatively, the employment opportunity index is also one of major factors to be considered in a person's decision to quit or retire. Studies have shown that people tend to have quitting intentions only if they perceive high rate of employment opportunities outside which means they quit mostly when they have a new job in hand (Griffeth & Hom, 1988; Muller, Boyer, Price & Iverson, 1994; Lambert, Hogan & Barton, 2001). Hutchens (1988) in his study on whether job opportunities decline with age revealed that older people have less choice in finding a new job or alternate employment opportunities for two reasons: firstly, younger people when trained, have more years to contribute skills to the company when compared to older workers. It is a long term investment in training younger employees. Second, as suggested by many studies, older people have lower pay rise while changing jobs when compared to their younger counterparts.

Retirement and the Factors Affecting It

Both retirement and turnover can be viewed as a form of withdrawal from the organization (Adams & Beehr, 1998). When an employee intends not to be a part of the organization, the path he takes is either quitting, retiring or getting laid off (Hanisch, 1995). Both turnover and retirement imply the same decision of

employee (i.e. to leave the organization), they substitute each other and retirement can be termed as one form of turnover (Adams & Beehr, 1995; Hanisch, 1995). A person's decision to retire is more a function of health, finances, and social commitments. Poor health seems to be a major predictor in retirement decision of employees (Shacklock & Brunetto, 2005). A survey on Norwegian workforce showed that the health problems associated with the elderly workforce can be categorized into three groups: musculoskeletal disorder, cardiovascular diseases and mental disorders (Blekesaune & Solem, 2005). Musculoskeletal disorders arise due to physical strain in the workplace such as lifting heavy loads etc. The psychological stress in the jobs can cause cardiovascular diseases and mental disorders (Blekesaune & Solem, 2005). Another health factor is the health of the spouse. Talaga and Beehr (1995) found that men continue to work for a longer time if their partner is in ill health to provide financial support and women on the contrary, leave their job to attend their sick partner.

A person's financial position can also strongly influence his decision to retire. A healthy financial position can call for a retirement decision at any phase of life (Shacklock & Brunetto, 2001). On the other hand, in weak financial conditions, the option of retiring may not be feasible. Financial obligations in the family allure workers to stay in the job (Shacklock & Brunetto, 2001). Owing to financial responsibility of children and elderly parents, many people are bound to continue working. According to O'Neill (1998), 'older baby boomers are already becoming financially sandwiched in their need to provide for two other generations' (as cited in Shacklock & Brunetto, 2001,

p.743). Many older workers are pushed to work because they are not able to sustain on their accumulated savings and pension. The social security and pension plans offered by the Government are deteriorating due to the country's economic crisis (Clement, 2004). Thus people have reduced retirement savings and are returning back to work.

Role of Work Organization Factors

As we have discussed in the earlier sections, literature shows that intention to quit is significantly influenced by job satisfaction levels one has in his/her work environment. Now the factors that influence job satisfaction are to be known. The role of age and tenure on job satisfaction levels have been discussed in the above sections. Related to job satisfaction is the notion of effect of the work organization. According to NIOSH (2000) work organization mostly involves scheduling of tasks, designing the job features (such as complexity, skill), management approach (maintaining team work culture, amicable atmosphere), employee-management relationship etc. (as cited in Carayon & Smith, 2000). Work organization is the way in which a job is defined, processed and supervised (Hagberg et al. 1995). According to need satisfaction model developed by Salanic and Pfeffer (1977), when a person's job characteristics satisfy his needs, his satisfaction levels are increased and he is motivated more in his job (as cited in Destefano, Clark, Gavin & Potter, 2006). Also, the Pearson-Environment fit model suggested by Schwartz, Pickering & Landsbergis (1996) concluded that a-stress free job environment contributes to high job satisfaction. Work organization might design a job with high repetitiveness, less cycle times and include static postures. Such kind of jobs increase tiredness and

fatigue in the workers and lead to injuries and poor health (Carayon, Smith & Haims, 1999). Therefore, an ergonomic approach is necessary in redesigning the work organization to ensure workers health and efficiency.

The Ergonomic Approach

Ergonomics can be treated as the science of equipment design aimed at reducing worker's fatigue and discomfort (Roper & Yeh, 2007). Its aim is to improve the compatibility between the person and the system/product. The International Ergonomics Association defined ergonomics as:

Ergonomics (or human factors) is the scientific discipline concerned with the understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data and methods to design in order to optimize human well-being and overall system performance ("International Ergonomics Association", n.d.).

Thus, the scope of ergonomics lies in both well being of the workers and the productivity of the organization. Dul and Karwowski (2004) in their work on ergonomics explicitly mentioned about the contributions of ergonomics to company strategies. Ergonomics can be applied to each and every department of an organization from product design to product marketing.

The measurement of risk factors and their relationship to injury and illness outcomes is the primary research area of many ergonomists and epidemiologists. Risk factors are usually grouped by type: 1) physical (force, vibration, awkward postures,

repetition), 2) psychosocial risk factors (job autonomy, distraction, time pressure), and 3) cognitive risk factors (attention load, memory demands) (Burdrof, 1992). Risk factors associated with the workplace are thought to be a major cause of musculoskeletal diseases (Westgard & Winkel, 1997). Workplace injuries pose a threat to many U.S employees. Every year, one million people are subjected to sick leave due the effects of work place injuries (Amick et al., 2004). These disorders are responsible for the loss in the work days costing on an average of 17 billion every year (Dudley & Delong, 2001).

Such disorders can lead to tiredness, frustration and result in poor health and loss in productivity. This reduces the morale of employees and leads to job dissatisfaction. Psychosocial risk factors such as less job control, work demands and less autonomy might not make a person tired but directly lead to job dissatisfaction. All these factors could ultimately lead to the intention of leaving.

The application of ergonomic interventions at the work place reduces the scope of injuries and enhances workers' productivity (Bohr, 2000). Analyses of the work environment and identification of risk factors and the measures to eliminate them have been the traditional goal of ergonomics (Westgard & Winkel, 1997). However, limited research has been conducted on the impact of ergonomic interventions to encourage employee retention by reducing workplace risk factors. The past research mainly focused on applying ergonomic principles to work stations to reduce the musculoskeletal disorders due to physical risk factors. In assessing the work place injuries or causes of work related musculoskeletal disorders, physical risk factors do not alone measure the complete risk associated (Warren, 2001). The effect of social environment aspects of the

work place, which are the psychosocial factors, should be taken into consideration. Psychosocial factors can directly predict the occurrences of musculoskeletal disorders or they could moderate the relationship between physical risk factors and development of musculoskeletal disorders (Warren, 2001).The literature on both the factors is discussed in the following sections.

Research on Physical Risk Factors

Reviews of literature identified heavy physical activities like lifting, manual handling, repetitive tasks, working in awkward positions, vibrations and force as the potential ergonomic risk hazards (Hoozemans, Beek, Fringsdresen, Dijk & Woude, 1998; Kelsey, 1982; Marras et al., 1995; Vikari-Juntura et al., 1996). Warren (2001) listed the most agreed physical risk factors by researchers around the world and published by the Ergonomics Program Standard and the list contains force, awkward postures, static postures, repetition, dynamic factors, compression and vibrations as the factors. According to Klitzman and Stellman (1989), physical stress and fatigue in jobs is significantly related to the workstation design. Janwantanakul, Pensri, Jiamjarasrangsri & Singsongsook (2008) researched on the prevalence of MSD's in Bangkok employees by conducting a twelve month follow up study. Disorders in spine and neck were found to be common in the office workers. Sedentary jobs in poorly designed ergonomic workstations were attributed to the cause of the disorders. There was an interesting finding from this study which stated that younger workers (below 30) were reported to have more symptoms of musculoskeletal disorders when compared to workers aged

above 49. This may be due to the fact that older workers gain enough experience to cope with the physical demands of the job. In a study about the interactions of physical and psychosocial risk factors with wrist, upper limb and neck disorders by Devereux, Vlachonikolis and Buckle (2002), it was found that exposure to both physical and psychosocial risk factors lead to disorders in upper limb but not in neck. It was also found that age does not pose to be a risk factor for upper limb disorders. However, the study did not research the causes of absence of neck symptoms.

The risk factors associated with extensive computer use has been increasing at an alarming rate in the last decade. In United States, over 77 million persons are using a computer at work in 2003 (Ijmker et al., 2006). The use of computer lead to awkward postures, static load, repetitive work and contact stress and these ultimately lead to musculoskeletal disorders (Amell & Kumar, 2000; Cook, Burgess-Limerick & Papalia, 2004). Juul-Kristensen and Jensen (2005) did a follow up study on employees in a Danish company to identify the risk factors predicting musculoskeletal disorders prevailing in the work place. It was found that extensive use of computers leads to neck/shoulder disorders and also speed of work was a predictor of lower back pain. It was recommended that variations should be provided while working with computer and the worker should be allowed to work at his own pace. In a prospective research study on musculoskeletal disorders in office workers conducted by Ijmker et al., (2006), a detailed insight on exposures and outcomes on computer usage time among employees in 5 companies was collected. This study lasted for 24 months with the assessment of outcomes for every 3 months. It was found that extensive occupational computer usage

coupled with unhealthy posture and poor work station design will often lead to development of musculoskeletal disorder symptoms in the hand, arm, neck and shoulder. The main advantage of this study is its long duration making it more reliable.

Blatter and Blongers (2002) investigated the relationship between upper limb disorders and duration of computer use and how this varies with gender. Working on computer for more than 4 hours and 6 hours in women and men respectively resulted in risks for development of work related upper limb disorders. The use of a mouse did not make any difference as frequent computer users using a mouse did not report any increase in MSD symptoms than people who do not use a mouse. Cook, Burgess-Limerick & Papalia (2004) performed a study on the effect of wrist rest on the wrist posture in keyboard and mouse usage. The study was measured by a typing and a mouse task on female typists. It was found that there was a considerable decrease in left wrist flexion during typing using a wrist rest but the use of a wrist rest while using a mouse did not make a significant difference. It was observed in another study that people with musculoskeletal disorders tend to apply more force while using a keyboard (Wahlstrom, 2005).

The adverse effects of exposure to whole body vibration have been wide spread in many occupations especially in the transportation field among jobs such as tractor drivers, fork lift drivers and helicopter pilots etc. (Bovenzi & Hulshof, 1998). Boshuizen, Bongers & Hulshof (1990) conducted a comparative study on whole body vibration and back pain among tractor drivers. It was found that the symptoms of back pain increased

with increase in exposure to whole body vibration and if this extends beyond the threshold limits, it might become a threat to the worker's health.

Another risk factor commonly associated with the workplace, especially in material handling jobs is improper lifting and the consequence of it is lower back pain. The National Institute of Occupational Safety and Health (NIOSH) developed initial guidelines for lifting and this lifting equation has been modified after few years including asymmetry and coupling factors (Waters, Putz-Anderson, Garg & Fine, 1993). Ferguson, Marras and Burr (2005) developed guidelines for returning workers suffering from low back pain. The study provided a scientifically validated spine tolerance levels and also suggested specific tasks which are safe for workers returning to jobs from low back injuries.

Trinkoff, Brady & Nielson (2003) studied the relationship between physical job demands and the musculoskeletal disorders related to neck, back and shoulder on a group of nurses. The results showed that as demands increased the reports of prevalence of MSD's increased. Activities including awkward postures were found to be most likely to lead to MSD's at all parts.

The importance of implementation of ergonomic principles along with ergonomic education was demonstrated by Amick et al. (2003). They performed a follow up intervention study on the role of ergonomically designed office chair coupled with ergonomic training, with the employees from a revenue service department. The subjects were divided into three groups: the first group received the adjustable chair as well as the ergonomic training, the second one received only training and the third was third control

group. A short daily symptom survey was filled by the subjects everyday during the course of the study. The first group reported decrease in the work place disorders when compared to the other groups. There was no significant difference between the training only and the control group. Thus, the authors concluded that even though the training increased the awareness of ergonomics among employees, unless ergonomically designed tools are provided, the benefits are not perceived.

Research on Psychosocial Risk Factors

The research on psychosocial risk factors found that factors individual control, job demands, time pressure and autonomy in jobs are significant organizational factors that influence performance of any employee (Carayon, Smith & Haims, 1999). Organizational risk factors (in this case, often termed psychosocial factors) are behavioral factors associated with a work environment and they can result in development of stress and strain symptoms (Bongers, de Winter, Kompier, Hildebrandt, 1993; Hagberg et al., 1995). Psychosocial work factors have been defined as Hagberg et al., (1995) as " subjective perceived aspects of the work organization that have an emotional connotation for workers and managers and that can result in stress and strain" (Carayon, Smith & Haims, 1999). Karasek's (1979) model of job strain found that low decision latitude and heavy job demands are attributed to the development of mental strain in the work place. Past research has found that high work control leads to higher levels of job satisfaction (Lee & Brand, 2005; Maclaney & Hurrell, 1998; O'Neill, 1994). More control over one's job may help an employee cope with distraction (Lee & Brand, 2005). In a study by

Maclaney and Hurrell (1988) on different levels of control in a work environment like job control, decision control and control on the physical environment, it was found that the higher the control over the job, the higher are the satisfaction levels. Similar work by Lee & Brand (2004) showed that more control over the job and more flexibility lead to job satisfaction which ultimately enhanced the performance and productivity of the employees.

Several studies in the literature demonstrated the link between psychosocial risk and musculoskeletal disorders. Psychosocial risk factors lead to psychological strain which exacerbates the effects of various physical risk factors thus increasing the chances of development of musculoskeletal disorders (Landsbergis, Schnall, Warren, Pickering & Schwartz, 1994). According to Smith & Carayon (1996), psychosocial risk factors can lower an employee's motivation and job satisfaction level which in turn increases the risk of development of work related musculoskeletal disorders (Carayon, Smith & Haims, 1999). Conway, Smith, Cahill & Legrande (1996) performed a logistic regression to identify the relationship between the psychological tension experienced by the workers and the musculoskeletal pain reported and the results indicated that there exists a strong association between the two and the tension can predict the levels of the pain experience by the worker (Carayon, Smith & Haims, 1999). High pressure, low pay and repetitive job are the best predictors for work related musculoskeletal disorders (Schmitt, Colligan & Fitzgerald, 1980). In addition, on a review of epidemiological studies on the effects of psychosocial factors on the musculoskeletal disorders by Bongers, de Winter, Kompier &

Hildebrandt (1993), it was found that high workload, monotonous job structure, lack of decision latitude, time pressure contributed to the prevalence of musculosketal disorders.

Toomingas, Theorell, Michelson & Nordemar (1999) in their study on the relationship between psychosocial risk factors and the most affected musculoskeletal disorder regions, found that high job demands and low job support predict the symptoms of musculosketal disorders in the neck and the low back region. Research on low back pain showed that people with back injuries have lower levels of job satisfaction, are not productive in work and this leads them to perceive psychosocial risk factors at work (Feyer et al., 1992). From the study by Faucett and Rempel (1994), it was found that lower levels of job discretion and lower levels of support from co workers lead to disorders in the upper body regions such as upper extremity numbness (Carayon, Smith & Haims, 1999).

MacDonald, Karasek, Punnett & Scharf (1994) investigated the possibility of correlations between the physical and the psychosocial risk factors on a group of blue-collar and white-collar workers in a manufacturing environment. An exploratory factor analysis was performed and it was found that moderate correlation existed between physical and psychosocial risk factors and the covariance was high between the top level production worker and low level clerical workers. The analysis revealed that there exists a relationship between the stresses causing the risk factors in the work place. This study provided a base framework for the concept of associating the two risk factors in working towards the reduction of musculoskeletal disorders (MacDonald, Karasek, Punnett & Scharf, 1994).

Ergonomic Assessment Exposure Methodology

The measurement of the ergonomic risk factors is a very vital process and has attracted the attention of many researchers and practitioners in the field of ergonomics (David, 2005). The assessment tools to measure the ergonomic risk factors can be categorized into three methods: 1) self reports, 2) observational techniques, and 3) direct measurement (David, 2005; Spielholz, Silverstein, Morgan, Checkoway & Kaufman, 2001; van der Beek & Frings-Dresen, 1998).

Self reports are the data collected from the worker on the degree of physical and psychosocial risk factors through work diaries, interviews and questionnaires (David, 2005). They are the simplest form of ergonomic assessments, very useful with a large sample size and can be performed at a low cost (David, 2005). They are very diverse in nature which makes them applicable to a large set of job scenarios and various occupations (David, 2005). Few self reports also include expert judgments where trained individuals observe the overall exposure of the workers through a series of checklists (ban der Beek & Frings-Dresen, 1998). Currently web based questionnaires are commonly used with discrete or continuous response scales (Spielholz, Silverstein, Morgan, Checkoway & Kaufman, 2001). Despite these advantages, the validity and the precision of these self reports has been a matter of concern making them the least reliable technique of ergonomic assessment (David, 2005).

Observational techniques include video recording of the task (Spielholz, Silverstein, Morgan, Checkoway & Kaufman, 2001). Video recording will enable the

observer to record the task and analyze it more clearly since there are the options of pausing it and retrieving it as many times as needed (Spielholz, Silverstein, Morgan, Checkoway & Kaufman, 2001). It will also allow the observer to pay attention to the finer details of the task (David, 2005). Advanced observational techniques use the help of software programs in analyzing the results. Various parameters such as distance, acceleration and angular changes can be calculated (David, 2005). Few examples of observational techniques are the Ovako Working Posture Analyzing System (OWAS), Rapid upper Limb Assessment (RULA) (David, 2005). This technique suffers from the drawback that there is a lot of randomness and some parts of the task may not be captured in the recording. Also, there might be some inaccuracy and variability in the results due to the presence of a camera which might affect the workers behavioular patterns (Spielholz, Silverstein, Morgan, Checkoway & Kaufman, 2001).

Direct measurement techniques include attaching motion capturing instruments to the workers (David, 2005). The common examples of direct measurement are electromyography meters (EMI) that can record muscle activities, electronic goniometry that can record activities at limb joints and inclinometers that can record two dimensional movements with reference to gravity (David, 2005 & Spielholz, Silverstein, Morgan, Checkoway & Kaufman, 2001). All these sensors are connected to a computer and with the help of specific software; a thorough analysis can be done in various dimensions (David, 2005). The direct measurement techniques are undoubtedly the most superior and precise methods of ergonomic exposures. But the drawbacks associated with them are that they are very tedious and costly in nature (David, 2005 & Spielholz, Silverstein,

Morgan, Checkoway & Kaufman, 2001). The equipment used for these techniques is very expensive and a sufficient amount of money and highly trained individuals are required for their maintenance. They require large number of subjects and the process may take up long periods of time which makes the data analysis an impractical and time consuming task. Also, there might be variability and inaccuracy in the output due to the presence of sensors on the workers (David, 2005 & Spielholz, Silverstein, Morgan, Checkoway & Kaufman, 2001).

With the availability of three common methods of ergonomic measurement, it depends upon the nature of the research to be conducted and the amount of resources available to determine an assessment method. David (2005) summarized a few parameters to be considered while choosing a measurement technique: exposure measure (what is being measured: posture, force or muscle activity), exposure dimension (Is the response being measured in terms of frequency, duration or level), nature and number of the subjects (large samples vs. individual assessment), cost, feasibility and nature of work and work place.

The current study uses the self report technique of measurement with the questions categorized into eight categories. This technique was chosen because of its robustness, versatility and keeping in mind the nature of the study and the resources available (this being a pilot study). Few studies were able to establish the validity of the self administered questionnaires and attempted to compare their results with those of direct measurement and observational techniques (Hansson et. al., 2001; Viikari-Juntura et.al., 1996; Bot et.al., 2004 & Pope et al., 1998). Viikari-Juntura et al. (1996) in his study

on the comparison of log book and self questionnaire methodology to observational techniques by a trained individual found that there exists good correlation between the two.

In a similar study conducted by Pope, Silman, Cherry, Pritchard & Macfarlane (1998) it was found that the accuracy of self reported questionnaires was satisfactory. The study also compared the two techniques with respect to the three dimensions of measurement (frequency, duration and measurement). More than 60% agreement was found between the observed frequency and reported frequency. However, there was some variability in the observed duration and reported duration for few tasks such as repetitive. Very few studies used duration as the measurement variable and reported different outcomes owing to the fact that duration as a measure is hard to quantify (Pope, Silman, Cherry, Pritchard & Macfarlane, 1998). It also might be due to the fact that different studies used different scales of duration responses (from proportion of time spent in work shift to hours spent /week or hours spent/day in a task) (Pope, Silman, Cherry, Pritchard & Macfarlane, 1998). More research has to be done in this area and this study attempts to research the validity of self reported questionnaire using the time spent on various activities approach for the response scale.

Background of Exploratory and Confirmatory Factor Analysis

Exploratory factor analysis can be defined as "orderly simplification of interrelated measures which are used to explore the possible underlying factor structure of a set of observed variables without imposing a preconceived structure on the outcome"

(Shur, 2001). The researcher has no prior hypothesis and aims only at finding out the "underlying latent factors in a construct" (Floyd & Widaman, 1995). Exploratory factor analysis is mainly used for data reduction where the scale needs to be diminished to a few factors which account for the most variance and reliability (Floyd & Widaman, 1995). In extracting the factors, two approaches can be followed: Principal Component Analysis (PCA) and Principle Axis Factoring (PAF). PCA is primarily used for data reduction techniques and PAF is used when we want to know how the underlying variables in the construct are interrelated (Floyd & Widaman, 1995). According to Fabrigar, Wegener, MacCallum & Strahan (1999), PAF aims to measure the correlations between the variables where PAC determines the variance associated with each variable in the construct. Coming to the number of factors to be extracted, the Kaiser-Guttman rule of thumb exists. The rule says to extract the factors with Eigenvalue > 1.00 (Nunnaly, 1978 & Shur, 2001). The other popular method is the scree test method where a scree plot is generated with the Eigenvalues. The values above the breakeven point of the scree plot are retained (Costello & Osborne). The next step is the factor rotation where the factors are rotated around the origin to a new position such that they are easily interpretable (Reise, Waller & Comrey, 2000). Oblique rotation, orthogonal rotation and Varimax rotation are the three common methods of rotation, Varimax rotation is used when the goal is to find a simple structure (Ford, MacCallum & Tait, 1986).

Confirmatory factor analysis is used when want we to test an existing model. It can be defined as "a statistical technique used to test the hypothesis that a relationship between the observed variables and their underlying constructs exists" (Shur, 2001). It

helps us in knowing how well the responses are in line with the hypothesized model of factors (Swisher, Beckstead & Bebeau, 2004). Confirmatory factor analysis is very useful in validating data from multiple item and multiple scale questionnaires (Swisher, Beckstead & Bebeau, 2004). The model fit is evaluated based on a number of statistical parameters. The chi-squares per degrees of freedom imply the discrepancies in the model and the deviations of the correlations of the factors from the original (Swisher, Beckstead & Bebeau, 2004). The model is treated as a good fit if the chi-squares per degrees of freedom is five or lesser (Mak & Sockel, 2001). The goodness of fit index (GFI) and normal fit index (NFI) range from 0 to 1 and any value above 0.9 is a good fit (Mak & Sockel, 2001; Swisher, Beckstead & Bebeau, 2004). The comparative fit index (CFI) is the discrepancy adjusted for the variance in the sample size and it ranges from 0 to 1 (Shur, 2001). Any value greater than 0.9 indicates an acceptable model (Shur, 2001; Mak & Sockel, 2001; Swisher, Beckstead & Bebeau, 2004). The Root mean square value (RMSEA) is the measure of the residual in the model and should be always less than 1.00 (Shur, 2001; Mak & Sockel, 2001). A RMSEA value of 0.05 or below indicates a very good fit (Shur, 2001; Hu & Bentler, 1999).

Hypotheses

The main aim of this study is to determine the role of various ergonomic predictors on tiredness in the work place, job satisfaction and intent to leave.

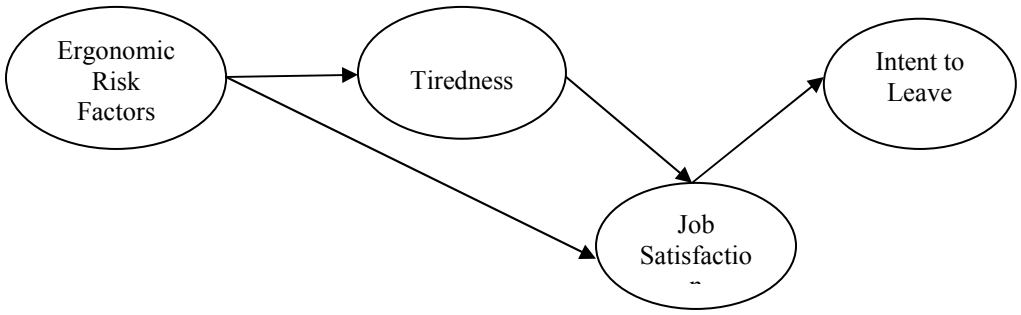


Figure 1: The model showing the relationship between physical and organizational risk factors and intent to leave.

Our hypothesized model shown in the Figure 1 above, assumes that ergonomic risk factors in the work place lead to tiredness. When a person is tired, it leads to

frustration, lowers the productivity levels and hence decreases job satisfaction levels. Also, we hypothesize that the risk factors can directly affect a person's job satisfaction levels without actually making him tired. Lower job satisfaction levels triggers a person's intentions to leave or retire. So, we next hypothesize that the higher the job satisfaction levels, the lower are the intentions to quit. In addition to the job satisfaction, alternate employment opportunities also have an effect on person's intentions to quit. We hypothesize that the higher the employment opportunity indices, the higher the chances of quitting. It is interesting to know the role of age in the above. The hypotheses are listed as below:

Hypothesis 1: The ergonomic factor scale will predict physical tiredness. This relationship will be significant after controlling for age and tenure.

Hypothesis 2: The ergonomic factor scale will predict mental tiredness. This relationship will be significant after controlling for age and tenure.

Hypothesis 3: a) The ergonomic factor scale will predict job satisfaction. This relationship will be significant after controlling for age and tenure, b) the tiredness variables will also predict job satisfaction.

Hypothesis 4: a) The ergonomic factor scale will predict intent to leave after controlling for age and tenure, b) additionally, job satisfaction and employment opportunity index will contribute significantly to the model in the 4a.

CHAPTER 3: METHODOLOGY

Development of the Survey Instrument

The survey used in this study on employee retention was developed by Dr. Diana Schwerha and Dr. Rodger Griffeth as a part of the pilot project funded by the National Institute of Occupational Safety and Research (NIOSH) and it had undergone IRB (Institutional Review Board) approval. The questions were based on the existing literature on the possible factors affecting retention/retirement. The initial draft was tested with three different focus groups.

Focus Groups

In recent years focus groups have gained increased popularity in improving surveys. Focus groups serve as valid tools in obtaining foresight knowledge about the research topic to be conducted (Barrett & Kirk, 2000). Focus groups output help in the refinement of the survey instrument and increase its validity (Morgan, 1997). Morgan (1997) stated three different ways the focus groups can help in the development of survey questionnaire. Firstly, conducting a focus group helps to know whether the survey has covered various aspects of the research problem it intended to measure and also tests the researcher's view point with that of the subjects. Secondly, focus groups assist in better understanding the items that exactly represent the various topics in the research study, from the feedback of the participants. Finally, the researcher will get to know if the terminology used is easily understood and the questions are interpreted in the right

manner. But, there are also chances of the focus group subjects perceptions shadowing the ideologies of the researcher which otherwise is intended to a larger population sample (Morgan, 1997 & Barrett & Kirk, 2000).

For this experiment, the subjects who participated in the focus groups were baby boomers (50 year old or above) from the local community. An invitation letter describing the purpose of the focus group and a copy of the initial survey draft was mailed to all the participants one week before the actual session. Participants were asked to bring the completed survey with them to the focus group session. Each session consisted of 10 participants and lasted for about 90 minutes. The subjects gave informed written consent and were paid $30.00 each. The subjects were asked to express their comments, clarifications and confidentiality issues about the survey at the beginning of the focus group session.

The goal of the focus groups was to determine the clarity of the questions and whether the factors stated in the questionnaire were important to workers with regard to retention. By following input from the focus group participants a few changes were made to the survey questionnaire. First, several items in the work station category such as walking, talking on phone, temperature extremes, and time pressure were added. Similarly, the question on being valued by the employer in the job was added on the suggestion made by many focus group participants. Some questions were reworded to ensure the clarity and the order in which they were asked (going from specific to general) was changed. Questions such as number of years in employment were broken down to more specific parts like number of years in full time, part time, in the present company,

outside the home etc. The question about the worker's income was added after discussing in the focus groups about the comfort in answering it. The initial draft that was distributed to the focus groups consisted of five sections. After incorporating the changes made from the feedback of focus groups, the final draft of the survey consisted of nine categories with one hundred seventy-six questions.

Research Instrument

The finalized retention survey included the workers demographic information, items on possible factors affecting person's intention to quit and questions on perceptions about retirement. The purpose of the research and the confidentiality statements were furnished at the beginning of the survey. The nine categories included in the questionnaire are job characteristics (42 questions), possible changes to worksite that could encourage retention (25 questions), perceptions about working/retirement (14 questions), and intentions to quit work (3 questions), work and organizational context factors (50 questions), wellness programs (10 questions), job satisfaction measure (5 questions), an employment opportunity index (14 questions) and demographics (5 questions).

The present study deals with only few of the categories in the retention survey. It includes the entire category one, the job characteristics category of the questionnaire which contained items on the nature of the work. The first twenty-five questions in this category are on the time spent in doing jobs that involve various physical activities such as walking, kneeling, standing, lifting, back flexion, whole body vibration, computer

work, typing, talking on phone etc. and working in a environment that is short staffed, have little control, under time pressure and amidst lot of distraction. The response scale for these questions measured the time spent in each activity and ranged from 1 to 5 where 1 denotes "*not at all* "and 5 denotes "> *6 hours*". The questions on the nature of job such as "*is it physically tiring or mentally tiring?"* are the next four in this category and the response scale is a five point Likert scale. Likert scale responses are very useful in behavioral research studies using survey questionnaire and are extensively used for studies in factor analysis (Hinkin, 1999). The five point Likert scale ranges from the responses being *strongly disagree, disagree, not sure, agree* and *strongly agree*.

The next category used in the study is the intention to quit scale which elicits the perceptions of the subjects on their chances of leaving the organization in the next one year. The responses were measured on a five point Likert scale ranging from "*no chance*" to "*100% chance*". Average of the two responses was calculated and is used in the survey (See Appendix A, Category 4). The study also uses the average of a validated job satisfaction measure containing five questions on the degree of job satisfaction (Allen, Shore & Griffeth, 2003). Five point Likert scale ranging from "*strongly disagree* "to "*strongly agree"* was used to measure the responses job characteristics category (See Appendix A, Category 7). The average responses for the fourteen questions on the alternate job opportunities in the employment opportunity index category of the section are used in the study. The employment opportunity index followed and included a seven point Likert scale ranging from *strongly disagree, moderately disagree, disagree, neither agree nor disagree, agree, moderately agree* and *strongly agree* (See Appendix A,

Category 8) . This is also a validated scale (Griffeth, Steel, Allen & Bryan, 2005).

Summary of the categories used in the retention survey is given in the following Table 1.

Table 1: Retention Survey Categories Analyzed in the Present Study

Category	Description	Number of items	Scale Used
Job Characteristics			
1)Ergonomic Risk Factors	Questions on time spent on physical and psychosocial activities of the job	25	Likert Scale 1 to 5
2)Tiredness	Questions on the nature of the job i.e. physically tiring or mentally tiring.	4	Likert Scale 1 to 5
3)*Job Nature*	Questions on number of work hours, shift, tenure, job title, age.	9	Continuous Variable
Intent to leave	Questions on intentions to leave the organization.	2	Likert Scale 1 to 5
Job Satisfaction Measure	Questions on the levels of job satisfaction in everyday work	5	Likert Scale 1 to 5
Employment Opportunity Index	Questions on the alternate job opportunities	14	Likert Scale 1 to 7

Administration of the Survey

The sample size for this study consists of employees from two organizations. Sample I – a health care organization and sample II – a distribution center. Employers from the two companies were approached with the objective of the survey and were asked to inform their employees about the project and requested their participation. The participation was voluntary and purely out of the worker's interest. Both the samples were administered in different ways. Nine hundred and fifteen employees received the surveys in the sample I. The management was asked to distribute the surveys at the organization and the responses were mailed back through U.S mail. Three hundred and ninety seven surveys were returned back with the response rate of forty-three percent.

The surveys at the sample II were administered personally at the distribution center during a course of one and half days and covered all the three – night, day and afternoon shifts. Employees who were ready to participate were given time off during the course of their shift to answer the survey. The surveys were sealed on the spot to ensure confidentiality. Two hundred and fifty surveys were obtained from the sample II.

The retention survey for both the samples differed in the number of questions. The survey distributed to the distribution center did not contain the category of work and organizational factors and few questions from the category of possible changes to work site that could encourage retention due to the reluctance of the management to answer those questions (See Appendix A and B for copy of the surveys).

Statistical Analysis

Validation of the Data

All the data were entered into SPSS 16.0 version manually by three researchers. The data was validated to check for the assumptions of normality and presence of any outliers. Both the samples were combined and the validation tests were run on the combined data set in SPSS 16.0. Normality was checked by conducting the Skew and Kurtosis tests and plotting the normal probability plot. The presence of outliers can possibly affect the appropriateness of the model. Outliers in the data may arise due to the incorrect coding of the data, unattended missing data in the sample and irrelevant data from other items in the sample. A residual analysis was carried out on the data set to remove any possible outliers.

Exploratory and Confirmatory Factor Analysis

Initially an exploratory factor analysis was done on the sample I (n = 315) on the job characteristics category using SPSS 16.0. Principle Axis factoring with Varimax rotation was used. Factors with eigen values > 1.00 were extracted. The reliability of the scale was checked through Cronbach's alpha which is also computed in SPSS 16.0. The factors obtained from the exploratory factor analysis were confirmed through a confirmatory factor analysis on the sample II (n = 196) using AMOS 16.0.

Multiple Regression Analysis

The hypotheses were tested using multiple hierarchical regression analysis. This helps us to understand which factors significantly predict the dependent variable and know the variance associated with the model. For the purpose of hypotheses testing, the data was combined from the two samples and divided into two sets of 70% (n = 357) and 30% (n = 154) of the combined data. Initial regression was conducted on the 70% data (the testing model) and the results were confirmed by conducting the same regression analysis on the 30% data (the validation model). The variables were entered in a hierarchical order to identify the amount of variance explained in each step.

CHAPTER 4: RESULTS

Descriptive Statistics

The data analysis was initiated by calculating descriptive statistics and frequencies of the two populations on variables such as demographics, work hours, physical and mental tiredness, job wise physical tiredness and intent to leave which are described in the following sections.

Demographics

Table 2 and Table 3 list the demographics of the two samples. The results show that the mean age of the two samples is almost the same but female population dominated the health care organization while the distribution center was more of male population. The most populated jobs were that of receptionists and nurses in the healthcare organization and the split case department in distribution center.

Table 2: Demographics of Sample 1

Variable	**Mean**	**Std. Dev**	**Range**
Age(yrs)	41.89	11.94	21 - 77
Tenure (yrs)	8.07	7.72	0.5 – 42
Salary(per annum)	32,932	24,227	1,600 – 2,40,000
Population Distribution	**Male**		**Female**
	10.10%		89.90%
Most Populated Jobs	Receptionists – 25.20% Nurses – 20.40%		

Table 3: Demographics of Sample 2

Variable	Mean	Std. Dev	Range
Age(yrs)	40.44	12.744	19 - 66
Tenure(yrs)	12.58	10.78	1 - 6
Salary(per annum)	28,391.90	9478.86	15,000 - 75,000
Population Distribution	**Male**		**Female**
	61.75%		38.50%
Most Populated Job	Split Case Department – 32.30%		

Work Hours

Table 4 tabulates the number of working hours per week for the two Samples. It is clear from the statistics that almost all the employees in the sample I work for more than 40 hours in the week (94.4%) when compared to the employees in the sample II (57.4%).

Table 4: Work Hours per week in Both the Samples

Number of hours per week	Sample 1		Sample II	
	Frequency	**Percent**	**Frequency**	**Percent**
< 10 hours	11	2.80	1	0.50
10-20 hours	10	2.50	3	1.00
20-40 hours	148	37.30	11	4.10
>40 hours	228	57.40	232	94.40
Total	397	100.00	247	100

Physical Tiredness

Table 5 and Table 6 show the means and standard deviations of being physically tired at the end of the day for both the samples. These have been calculated on overall data and also by job type. The data was split according to the job category and the analysis was performed.

The overall mean is 3.46 for the health care data. In the health care organization, the mean on physical tiredness was high on housekeepers, laboratory workers and nurses.

Table 5: Physical Tiredness (overall and job wise) Descriptives for Sample 1

Order	Variable	Number	Mean	Standard Deviation
	Overall	389	3.46	1.28
1	Housekeeping	6	4.5	0.54
2	Lab other	6	4.17	0.75
3	Nurse	79	3.9	1.1
4	Specialized Medical	12	3.83	1.03
5	Clerk	30	3.63	1.37
6	Technologist	30	3.5	1.16
7	Manager	19	3.37	1.46
8	Physical Therapy/Rehab	24	3.29	0.95
9	Receptionist	100	3.13	1.25
10	Computer Work	9	3.11	1.61
11	Other	2	3	1.41
12	Finance/Marketing	20	2.95	1.63
13	Assistant	10	2.8	1.39

In the distribution center, the mean on physical tiredness was high on employees working in the manual replenishment, split case and full case areas of the plant.

Table 6: Physical Tiredness (overall and job wise) Descriptives for Sample 2

Order	Variable	Number	Mean	Standard Deviation
	Overall	245	4.33	1.07
1	Manual Replenishment	22	4.91	0.29
2	Split Case	81	4.74	0.66
3	Full Case	11	4.73	0.46
4	Receiving	18	4.17	1.04
5	Machine Stocking	10	4.1	1.19
6	Shipping	35	4.03	1.27
7	Maintenance/Custodial	9	3.78	1.3
8	Other	47	3.7	1.367

A two sample Z test was conducted to compare the means of the two samples. The overall mean for the distribution center data (mean = 4.33) is higher when compared to health care organization (mean = 3.46). This was confirmed by conducting a two sample Z test on the means of the population was conducted at a significance level of 0.05 which yielded a P-value of 0.00, thereby implying that the difference in the means is statistically different.

Mental Tiredness

Table 7 and Table 8 show the means and standard deviations of being mentally tired at the end of the day for both the samples calculated on overall data and also by job type. It is interesting to note that the overall mean for being mentally tired (mean = 4.28) is relatively high to that of being physically tired (mean = 3.46) for the health care data. A two sample Z test was conducted at a significance level of 0.05. The analysis revealed a P- value of 0.00 there by confirming that both the means are significantly different. In the health care organization, the mean on mental tiredness was high on receptionists, assistants and managers.

Table 7: Mental Tiredness (overall and job wise) Descriptives for Sample 1

Order	Variable	Number	Mean	Standard Deviation
	Overall	392	4.28	0.87
1	Lab other	6	4.83	0.41
2	Receptionist	100	4.54	0.67
3	Assistant	10	4.5	0.53
4	Manager	19	4.47	0.51
5	Finance/Marketing	21	4.29	0.78
6	Nurse	79	4.26	0.86
7	Specialized Medical	12	4.25	0.86
8	Computer Work	9	4.2	1.31
9	Clerk	31	4.19	1.07
10	Physical Therapy/Rehab	24	4.04	0.62
11	Other	2	4	0
12	Technologist	30	3.73	1.08
13	Housekeeping	5	3	1.87

The statistics for the distribution center show that the employees in the distribution center are being equally tired (physically and mentally) at the end of the day. There is not much difference in both the means. A two sample Z test was conducted at a significance level of 0.05 to prove the above statement. A P-value of 0.32 was found which is not great enough to show that there is a statistically significant difference between the samples. The mean on being mental tired was high on employees working in receiving and machine stocking areas of the distribution center.

Table 8: Mental Tiredness (overall and job wise) Descriptives for Sample II

Order	Variable	Number	Mean	Standard Deviation
	Overall	246	4.15	1.09
1	Receiving	19	4.74	0.73
2	Machine Stocking	10	4.7	0.67
3	Other	47	4.36	0.94
4	Manual Replenishment	22	4.18	1.05
5	Split Case	81	4.02	1.19
6	Shipping	35	3.94	1.23
7	Maintenance/Custodial	9	3.78	0.97
8	Full Case	11	3.73	1

Average Intent to Leave

Descriptives on Average Intent to Leave were calculated and results are shown in the table 9. The mean is high on the distribution center data (mean = 2.29) when compared to the health care data (mean = 1.58) which implies the need for the distribution company to start its measures against retention**.**

Table 9: Descriptives for Average Intent to Leave for Both the Samples

Data population	Number	Mean	Standard Deviation
Sample 1	393	1.58	0.87
Sample 2	248	2.29	1.21

Exploratory Factor Analysis

The Exploratory Factor Analysis was done in SPSS statistical software and yielded four factors with a total of 16 items which are tabulated below in Table 12.

Table 10: Summary of Exploratory Factor Analysis

Item Number	Scale Item	Load	% Variance
	Factor 1: Dynamic Work		
1.3	Walking (to and from tasks, offices, etc.)	0.765	17.601%
1.1	Standing	0.753	
1.2	Prolonged sitting mainly in one posture	-0.748	
1.8	Lifting objects more than 20 pounds	0.566	
1.7	Lifting objects less than 20 pounds	0.552	
1.18	Working in static postures	-0.502	
1.17	Speaking on phone (with headset)	-0.493	
	Factor 2: Psychosocial Work		
1.21	Working under time pressure (administrative tasks)	0.700	12.887%
1.24	Working on tasks that are short staffed	0.653	
1.22	Working under time pressure (manual tasks)	0.653	
1.20	Working in the midst of distraction	0.503	
1.25	Working on jobs where I have little control	0.435	
	Factor 2: Computer Work		
1.5	Typing and/or using a mouse	0.848	10.067%
1.6	Working on a computer	0.799	
	Factor 4: Awkward Postures		
1.15	Working with back flexed	0.659	6.162%
1.14	Working with arms above the shoulders	0.474	

Items intended to measure dynamic activities such as standing, walking, lifting and sedentary activities such as working in static postures and speaking on phone were

grouped into the first factor of 7 items which was named as Dynamic Work and accounted for the largest variance of 17.60%. Tasks having few staff, little control, time pressure and working in an environment with lots of distractions merged into the second factor called the Psychosocial Work. The second factor accounted for a variance of 12.887%. Computer based activities like typing, using mouse, working on a computer for longer hours mapped into the third factor which we labeled as Computer Work and it accounted for a variance of 10.067%. Jobs involving awkward postures such as back flexion, arms above shoulders emerged as the fourth factor called the Awkward Postures and the variance associated with it is 6.162 %. Overall, the amount of variance accounted for by these factors is 46.711%.

Cronbach's alpha and Correlations

Cronbach's alpha is used test the internal consistency of the scale. It helps us to know how closely a set of items are related. "Cronbach's alpha is an index of reliability associated with the variation accounted for by the true score of the "underlying construct" (Santos, 1999). The reliability coefficients α of the factors developed from the exploratory factor analysis were calculated on Sample I data (n = 315) and were found to be relatively satisfactory. Table 13 presents the means, standard deviations, correlations and Cronbach's coefficient α for the four factors for the

Table 11: Coefficient of alpha's (on the diagonal)

Factor	Mean	St.Dev	1	2	3	4
1	18.02	5.453	0.822			
2	9.78	3.464	0.068	0.748		
3	9.74	3.612	-0.570**	0.060	0.936	
4	7.51	3.610	0.527**	0.352**	-0.432**	0.571

Confirmatory Factor Analysis

A series of 6 models was tested and the best fit model was chosen among them. The exploratory factor analysis model with 16 items did not have a good fit. AMOS calculates modification indices and model fit parameters. Modification Indices are an estimate of how much will the discrepancies reduces if the constraint on a given parameter is removed .Based on modification indices, two items were removed from the scale (1.8 & 1.22). This improved the model fit but there was more room for improvement. As suggested by the modification indices, a couple of items were moved from one factor to the other and thus it differed from the one from EFA in the number of items per factor. Thus the final confirmatory analysis model (shown in Figure 2) consisted of 14 items. The measures of the final model are now described. The model had a chi-square minimum fit (Cmin/DF) of 1.842 where a value less than 5.0 indicates a good fit (Mak & Sockel, 2001). The root mean square error of approximation (RMSEA) vale was found to be 0.066 which indicated a good fit. Any value less than 0.1 indicates an acceptable model; an RMSEA of less than 0.05 indicates a very good model and the current one is pretty close to 0.05 (Suhr, 2001; Hu & Bentler, 1999). The goodness-of-fit

parameter (GFI) was found to be 0.912. The value of GFI ranges from 0 to 1 with any value greater than 0.9 indicates a strong fitting model (Mak & Sockel, 2001; Swisher, Beckstead & Bebeau, 2004). Similarly, the comparative fit Index (CFI) was found to be 0.928 where a value greater than 0.9 indicates a very good fit (Suhr, 2001; Mak & Sockel, 2001; Swisher, Beckstead & Bebeau, 2004). All these parameters indicate that a strong fitness of the model. The following table 12 summarizes the statistical parameters in CFA analysis.

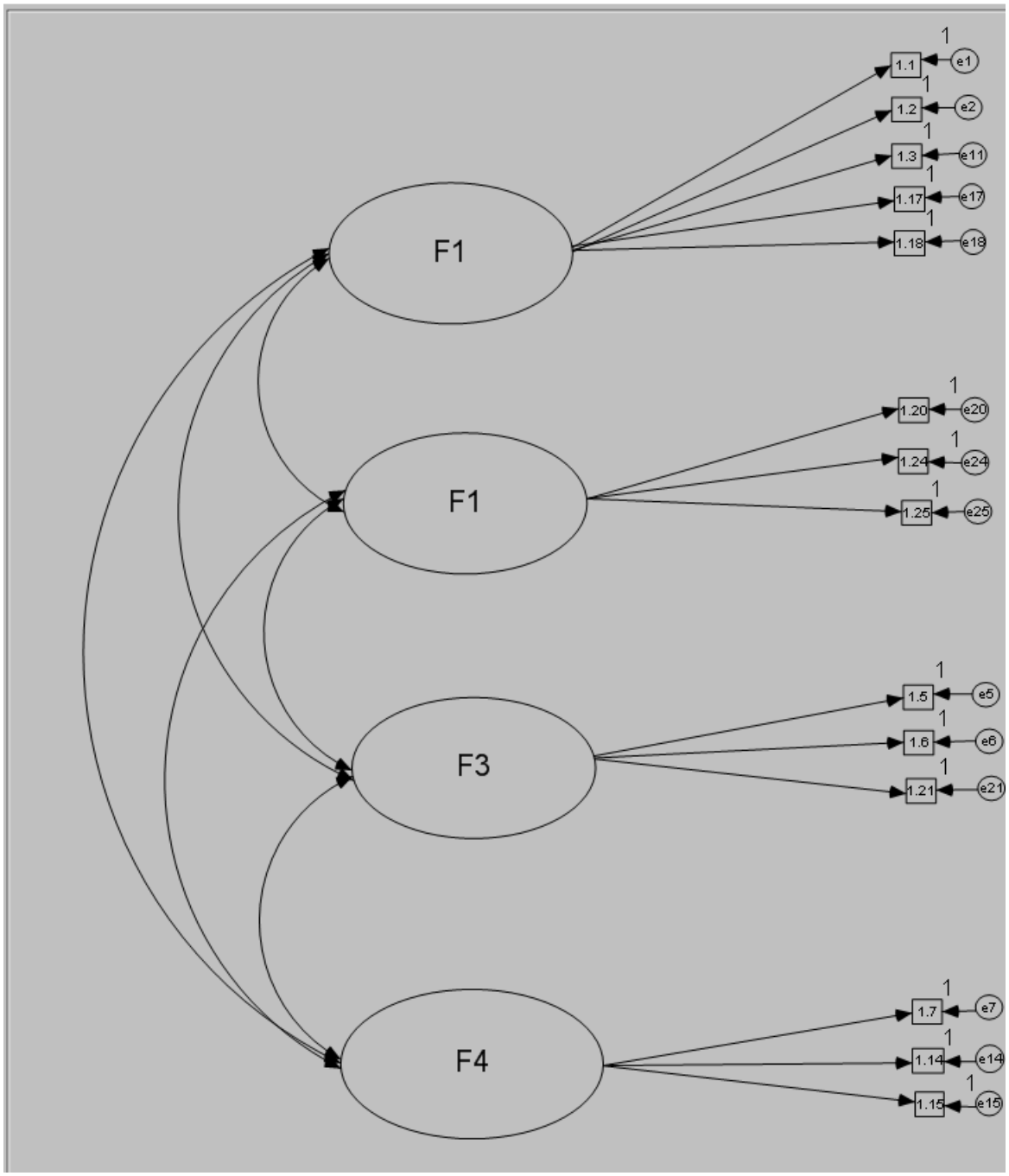


Figure 2: Confirmatory factor analysis final model with 14 items

Table 12: Final Model from the Factor Analysis

Item Number	Scale Item	Load
	Factor 1: Dynamic Work	
1.3	Walking (to and from tasks, offices, etc.)	0.765
1.1	Standing	0.753
1.2	Prolonged sitting mainly in one posture	-0.748
1.18	Working in static postures	-0.502
1.17	Speaking on phone (with headset)	-0.493
	Factor 2: Psychosocial Work	
1.24	Working on tasks that are short staffed	0.653
1.20	Working in the midst of distraction	0.503
1.25	Working on jobs where I have little control	0.435
	Factor 2: Computer Work	
1.5	Typing and/or using a mouse	0.653
1.6	Working on a computer	0.503
1.21	Working under time pressure (administrative tasks)	0.435
	Factor 4: Awkward Postures	
1.15	Working with back flexed	0.659
1.7	Lifting objects less than 20 pounds	0.566
1.14	Working with arms above the shoulders	0.474

Table 13: CFA Model Fit Indices

Statistical Parameter	Model Fit Value
Cmin/DF	1.824
RMSEA	0.066
GFI	0.912
CFI	0.928

Cronbach's alpha and Correlations

Cronbach's alpha was calculated on the sample II (n = 196) for the model developed from confirmatory factor analysis and the results are tabulated below in the table 16.

Table 14: Coefficient of alpha's (on the diagonal)

Factor	Mean	St.Dev	1	2	3	4
1	16.162	5.476	0.816			
2	8.543	3.111	-0.192**	0.585		
3	11.061	3.093	-0.490**	0.492**	0.706	
4	6.032	2.593	0.377**	0.177**	-0.144*	0.493

Development of Tiredness Scales

Two-item scales were developed for physical tiredness and mental tiredness. The physical tiredness scale consisted of the following two questions: 1) I would describe my job as physically demanding, 2) I am usually physically tired when I finish my work day. Reliability was calculated with Cronbach's Alpha and yielded the following results: Sample I = 0.696; Sample II = 0.794.

The mental tiredness scale consisted of the following two questions: 1) I would describe my job as mentally demanding, 2) I am usually mentally tired when I finish my work day. Reliability was calculated with Cronbach's Alpha and yielded the following results: Sample I = 0.729; Sample II = 0.772.

Correlations

Pearson Correlation Coefficients were calculated for each sample for the following variables: age, tenure, ergonomic factors, tiredness factors, job satisfaction, employment opportunity index and average intent to leave. Table 15 shows the correlation matrix for sample I and table 16 shows the correlation matrix for sample II.

Table 15: Correlation Matrix for Sample I

		Age	Ten	Dyn Work	Psych. Work	Comp. Work	Awkd. Post.	Tot Phy Tir	Tot Men Tir	Job Sat	EOI	Avg Intent
Age	P.C	1.000	.439**	-.035	.021	.021	.008	.074	.019	.188**	-.060	-.083
	Sig.		.000	.549	.721	.721	.894	.203	.746	.001	.307	.153
	N	301	300	301	300	300	301	299	301	294	290	300
Ten.	P.C	.439**	1.000	-.075	-.018	-.018	.064	.020	.023	.074	-.105	-.034
	Sig.	.000		.183	.756	.756	.259	.719	.681	.197	.069	.543
	N	300	314	314	313	313	314	312	314	305	302	313
Dyn Work	P.C	-.035	-.075	1.000	-.194**	-.194**	.377**	.428**	-.260**	.247**	.092	-.019
	Sig.	.549	.183		.001	.001	.000	.000	.000	.000	.108	.731
	N	301	314	315	314	314	315	313	315	306	303	314
Psych. work	P.C	.021	-.018	-.194**	1.000	1.000**	.176**	.219**	.396**	-.292**	.146*	.218**
	Sig.	.721	.756	.001		.000	.002	.000	.000	.000	.011	.000
	N	300	313	314	314	314	314	312	314	305	302	313
Comp. Work	P.C	.021	-.018	-.194**	1.000**	1.000	.176**	.219**	.396**	-.292**	.146*	.218**
	Sig.)	.721	.756	.001	.000		.002	.000	.000	.000	.011	.000
	N	300	313	314	314	314	314	312	314	305	302	313
Awkd. Post.	P.C	.008	.064	.377**	.176**	.176**	1.000	.343**	-.094	.026	.032	.034
	Sig.	.894	.259	.000	.002	.002		.000	.095	.652	.582	.550
	N	301	314	315	314	314	315	313	315	306	303	314
Tot PhyTir	P.C	.074	.020	.428**	.219**	.219**	.343**	1.000	.117*	-.071	.060	.065
	Sig.	.203	.719	.000	.000	.000	.000		.039	.215	.298	.254
	N	299	312	313	312	312	313	313	313	304	301	312
Tot Men Tir	P.C	.019	.023	-.260**	.396**	.396**	-.094	.117*	1.000	-.133*	.154**	.092
	Sig.	.746	.681	.000	.000	.000	.095	.039		.020	.007	.104
	N	301	314	315	314	314	315	313	315	306	303	314
JobSat	P.C	.188**	.074	.247**	-.292**	-.292**	.026	-.071	-.133*	1.000	-.160**	-.486**
	Sig.	.001	.197	.000	.000	.000	.652	.215	.020		.006	.000
	N	294	305	306	305	305	306	304	306	306	298	305
EOI	P.C	-.060	-.105	.092	.146*	.146*	.032	.060	.154**	-.160**	1.000	.324**
	Sig.	.307	.069	.108	.011	.011	.582	.298	.007	.006		.000
	N	290	302	303	302	302	303	301	303	298	303	302
Avg. Intent	P.C	-.083	-.034	-.019	.218**	.218**	.034	.065	.092	-.486**	.324**	1.000
	Sig.	.153	.543	.731	.000	.000	.550	.254	.104	.000	.000	
	N	300	313	314	313	313	314	312	314	305	302	314

Note: - 1) **. Correlation is significant at the 0.01 level (2-tailed).

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

3) P.C=Pearson Coefficient, Sig=Sigma (2-tailed), N=sample size, Dyn.Work = Dynamic Work, Psych.work = Psychosocial work factor, Comp. Work=Computer Work factor, Awkd. Posture=Awkward Posture factor, TotPhyTir=Total Physical Tiredness, TotMenTir=Total Mental Tiredness, JobSat = Job Satisfaction, EOI=Employment Opportunity Index, Avg. Intent = Average Intent to Quit.

Table 16: Correlation Matrix for Sample II

		Age	Ten.	Dyn. Work	Psych. Work	Comp. Work	Awkd. Post.	Tot Phy Tir	Tot Men Tir	Job Sat	EOI	Avg. Intent
Age	P.C	1.000	.607**	-.156*	.032	.168*	-.294**	-.130	.299**	.252**	-.135	-.281**
	Sig.		.000	.035	.665	.023	.000	.080	.000	.001	.076	.000
	N	183	183	183	183	183	183	183	182	181	175	182
Ten.	P.C	.607**	1.000	-.221**	.092	.323**	-.494**	-.258**	.343**	.120	-.044	-.275**
	Sig.	.000		.002	.202	.000	.000	.000	.000	.095	.549	.000
	N	183	196	196	196	196	196	196	195	194	188	195
Dyn. Work	P.C	-.156*	-.221**	1.000	.152*	.015	.354**	.292**	-.138	-.146*	.152*	.153*
	Sig.	.035	.002		.033	.837	.000	.000	.055	.042	.037	.033
	N	183	196	196	196	196	196	196	195	194	188	195
Psych. work	P.C	.032	.092	.152*	1.000	.119	.129	.166*	.230**	-.321**	.164*	.152*
	Sig.	.665	.202	.033		.096	.071	.020	.001	.000	.024	.034
	N	183	196	196	196	196	196	196	195	194	188	195
Comp. Work	P.C	.168*	.323**	.015	.119	1.000	-.367**	-.472**	.319**	.153*	-.008	-.039
	Sig.	.023	.000	.837	.096		.000	.000	.000	.033	.911	.584
	N	183	196	196	196	196	196	196	195	194	188	195
Awkd. Postures	P.C	-.294**	-.494**	.354**	.129	-.367**	1.000	.604**	-.273**	-.214**	.094	.162*
	Sig.	.000	.000	.000	.071	.000		.000	.000	.003	.199	.024
	N	183	196	196	196	196	196	196	195	194	188	195
Tot PhyTir	P.C	-.130	-.258**	.292**	.166*	-.472**	.604**	1.000	-.067	-.271**	.185*	.080
	Sig.	.080	.000	.000	.020	.000	.000		.352	.000	.011	.268
	N	183	196	196	196	196	196	196	195	194	188	195
Tot Men Tir	P.C	.299**	.343**	-.138	.230**	.319**	-.273**	-.067	1.000	.024	.077	-.085
	Sig.	.000	.000	.055	.001	.000	.000	.352		.742	.295	.240
	N	182	195	195	195	195	195	195	195	193	188	194
JobSat	P.C	.252**	.120	-.146*	-.321**	.153*	-.214**	-.271**	.024	1.000	-.357**	-.546**
	Sig.	.001	.095	.042	.000	.033	.003	.000	.742		.000	.000
	N	181	194	194	194	194	194	194	193	194	187	194
EOI	P.C	-.135	-.044	.152*	.164*	-.008	.094	.185*	.077	-.357**	1.000	.555**
	Sig.	.076	.549	.037	.024	.911	.199	.011	.295	.000		.000
	N	175	188	188	188	188	188	188	188	187	188	188
Avg. Intent	P.C	-.281**	-.275**	.153*	.152*	-.039	.162*	.080	-.085	-.546**	.555**	1.000
	Sig.	.000	.000	.033	.034	.584	.024	.268	.240	.000	.000	
	N	182	195	195	195	195	195	195	194	194	188	195

Note: - 1) **. Correlation is significant at the 0.01 level (2-tailed).

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

3) P.C=Pearson Coefficient, Sig=Sigma (2-tailed), N=sample size, Dyn. Work = Dynamic work factor, Psych.work = Psychosocial work factor, Comp. Work=Computer Work factor, Awkd. Post. =Awkward Posture factor, TotPhyTir=Total Physical Tiredness, TotMenTir=Total Mental Tiredness, JobSat = Job Satisfaction, EOI=Employment Opportunity Index, Avg. Intent = Average Intent to Quit.

Multiple Regression Analysis

The Testing Model

Hypothesis 1: Hypothesis 1 tested the predictive ability of the ergonomic factor scale for physical tiredness. The independent variables were entered in two steps; step 1 was age and tenure and step 2 included the ergonomic factor scale. The analysis yielded an R^2 (coefficient of determination) value of 0.453 meaning that the model explained 45.30% of the variance. Age and tenure were not significant predictors for physical tiredness but the ergonomic factor scale emerged as significant with all the four ergonomic factors as the significant predictors of physical tiredness ($\Delta R^2 = 0.449$, see table 32). Hence the analysis supported our hypothesis that the ergonomic factor scale led to physical tiredness. Model summary, ANOVA and the regression analysis for hypothesis 1 are tabulated in the Table 17, 18 & 19.

In order to check the assumption that the errors are approximately normally distributed a normal probability was done for the model (See Appendix C).

Table 17: Model Summary for Physical Tiredness

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1 (Age, Tenure)	0.061	0.004	-0.002	2.161
2(Age, Tenure, 4 Ergonomic Factors)	0.673	0.453	0.443	1.611

Table 18: ANOVA for Physical Tiredness

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5.671	2	2.835	0.607	0.545
	Residual	1526.826	327	4.669		
	Total	1532.497	329			
2	Regression	693.906	6	115.651	44.545	0.000
	Residual	838.591	323	2.596		
	Total	1532.497	329			

Table 19: Hierarchical Regression Analysis of Physical Tiredness

Independents	Unstandardized Coefficients		Std. Coeff	t	Sig.
	B	Std. Error	Beta		
(Constant)	7.051	0.429		16.418	0.000
1.41 age? (years)	-0.008	0.011	-0.043	-0.668	0.505
Tenure at Company	0.015	0.014	0.070	1.095	0.274
(Constant)	2.419	0.717		3.375	0.001
1.41 age? (years)	0.008	0.009	0.044	0.902	0.368
Tenure at Company	0.001	0.011	0.004	0.090	0.928
SumDynamicFactor	0.112	0.021	0.285	5.342	0.000
SumPsychosocialFactor	0.140	0.030	0.222	4.717	0.000
SumComputerWorkFactor	-0.066	0.033	-0.106	-1.989	0.048
SumAwkwardPostureFactor	0.196	0.034	0.315	5.789	0.000

Hypothesis 2: Hypothesis 2 tested the predictive ability of the ergonomic factor scale for mental tiredness. The independent variables were entered in two steps; step 1 was age and tenure and step 2 included the ergonomic factor scale. The analysis yielded an R^2 value of 0.139. Age did not emerge as a significant predictor but tenure and the ergonomic factor scale emerged as significant with all the ergonomic factors as the significant predictors except the dynamic work factor ($\Delta R^2 = 0.096$, see table 32). Hence the analysis supported our hypothesis that the ergonomic factor scale led to mental

tiredness. Model summary, ANOVA and the regression analysis for hypothesis 1 are tabulated in the Tables 20, 21 & 22.

In order to check the assumption that the errors are approximately normally distributed, a normal probability was done for the model (See Appendix C).

Table 20: Model Summary for Mental Tiredness

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1 (Age, Tenure)	.207	.043	.037	1.211
2 (Age, Tenure & Ergonomic Factor Scale)	.373	.139	.124	1.155

Table 21: ANOVA for Mental Tiredness

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	21.602	2	10.801	7.368	.001[a]
	Residual	482.287	329	1.466		
	Total	503.889	331			
2	Regression	70.255	6	11.709	8.776	.000[b]
	Residual	433.633	325	1.334		
	Total	503.889	331			

Table 22: Hierarchical Regression Analysis of Mental Tiredness

	Unstandardized Coefficients		Std. Coeff		
Independent Variables	**B**	**Std. Error**	**Beta**	**t**	**Sig.**
(Constant)	8.114	.240		33.743	.000
1.41 age? (years)	.009	.006	.086	1.364	.173
Tenure at Company	.019	.008	.150	2.384	.018
(Constant)	7.935	.514		15.449	.000
1.41 age? (years)	.007	.006	0.067	1.116	.265
Tenure at Company	.016	.008	0.131	2.165	.031
SumDynamicFactor	-.008	.015	-0.038	-0.561	.575
SumPsychosocialFactor	.056	.021	0.155	2.644	.009
SumComputerWorkFactor	.043	.024	0.122	1.811	.071
SumAwkwardPostureFactor	-.073	.024	-0.206	-3.017	.003

Hypothesis 3: **a)** To test the predictive ability of the ergonomic factor scale for job satisfaction, the independent variables were entered in two steps; step 1 was age and tenure and step 2 included the ergonomic factor scale. The analysis yielded an R^2 value of 0.354. Tenure did not emerge as the significant predictor of job satisfaction but age and the ergonomic factor scale emerged as significant with all the four ergonomic factors as the significant predictors of job satisfaction. (ΔR^2 =- 0.293, see table 32). Hence the analysis supported our hypothesis that the ergonomic factor scale predicts job satisfaction. Model summary, ANOVA and the regression analysis for hypothesis 1 are tabulated in the Table 23, 24 & 25.

In order to check the assumption that the errors are approximately normally distributed, a normal probability was done for the model (See Appendix C).

Table 23: Model Summary of Job Satisfaction - Ergonomic Factor Scale

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1 (Age, Tenure)	.248	.061	.056	1.009
2 (Age, Tenure & Ergonomic Factor Scale)	.595	.354	.342	.843

Table 24: ANOVA of Job Satisfaction - Ergonomic Factor Scale

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	21.795	2	10.897	10.694	.000[a]
	Residual	333.211	327	1.019		
	Total	355.006	329			
2	Regression	125.660	6	20.943	29.496	.000[b]
	Residual	229.346	323	.710		
	Total	355.006	329			

Table 25: Hierarchical Regression Analysis of Job Satisfaction - Ergonomic Factors Scale

	Independent Variables	Unstandardized Coefficients		Std. Coeff	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.554	.201		12.723	.000
	1.41 age? (years)	.025	.005	.288	4.606	.000
	Tenure at Company	-.018	.007	-.171	-2.733	.007
2	(Constant)	2.904	.378		7.679	.000
	1.41 age? (years)	.020	.004	.231	4.378	.000
	Tenure at Company	-.009	.006	-.081	-1.534	.126
	SumDynamicFactor	.024	.011	.127	2.187	.029
	SumPsychosocialFactor	-.138	.015	-.456	-9.011	.000
	SumComputerWorkFactor	.091	.017	.305	5.236	.000
	SumAwkwardPostureFactor	-.034	.017	-.113	-1.945	.053

b) To test the predictive ability of the tiredness factor scale for job satisfaction, the independent variables were entered in two steps; step 1 was age and tenure and step 2 included the tiredness variable scales. The analysis yielded an R^2 value of 0.195. Age, tenure and physical tiredness variable emerged as significant predictors of job satisfaction (ΔR^2=0.136, see Table 32). Hence, our analysis supported our hypothesis that the tiredness scale predicts job satisfaction. Results of hierarchical regression for hypothesis 1 are tabulated in the Table 26, 27 &28.

Table 26: Model Summary for Job Satisfaction - Tiredness Scale

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1(Age, Tenure)	.244[a]	.059	.053	1.014
2 (Age, Tenure, Tiredness Scale)	.441[b]	.195	.184	.941

Table 27: ANOVA for Job Satisfaction - Tiredness Scale

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	20.695	2	10.348	10.063	.000[a]
	Residual	328.036	319	1.028		
	Total	348.731	321			
2	Regression	67.865	4	16.966	19.149	.000[b]
	Residual	280.866	317	.886		
	Total	348.731	321			

Table 28: Hierarchical Regression Analysis of Job Satisfaction - Tiredness Scale

Independent Variables		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.568	.203		12.635	.000
	1.41 age? (years)	.024	.005	.283	4.458	.000
	Tenure at Company	-.018	.007	-.174	-2.742	.006
2	(Constant)	3.722	.434		8.578	.000
	1.41 age? (years)	.022	.005	.261	4.415	.000
	Tenure at Company	-.015	.006	-.148	-2.477	.014
	Total Physical Tiredness	-.179	.025	-.369	-7.292	.000
	Total Mental Tiredness	.015	.043	.018	.350	.726

Hypothesis 4: Hypothesis 4 tested the predictive ability of the ergonomic factor scale, job satisfaction and employment opportunity index for average intent to leave. The independent variables were entered in three steps; step 1 was age and tenure, step 2 included the ergonomic factor scale, step 3 included job satisfaction and step 4 included employment opportunity index. The analysis yielded an R^2 value of 0.418. Job satisfaction, employment opportunity index, tenure were found to be the significant

predictors of intent to leave (for ΔR^2, see Table 32).Model summary, ANOVA and the regression analysis for hypothesis 1 are tabulated in the Tables 29, 30 & 31.

In order to check the assumption that the errors are approximately normally distributed, a normal probability was done for the model (See Appendix C).

Table 29: Model Summary for Intent to Leave.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1(Age, Tenure)	.201	.040	.034	1.062
2(Age, Tenure, Ergonomic Factor Scale)	.397	.158	.142	1.001
3(Age, tenure, Ergonomic Factor Scale, Job Satisfaction)	.556	.310	.294	.908
4(Age, Tenure, Ergonomic Factor Scale, Job satisfaction and EOI)	.646	.418	.403	.835

Table 30: ANOVA for Intent to Leave.

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	15.072	2	7.536	6.680	.001[a]
	Residual	357.600	317	1.128		
	Total	372.672	319			
2	Regression	58.756	6	9.793	9.764	.000[b]
	Residual	313.916	313	1.003		
	Total	372.672	319			
3	Regression	115.383	7	16.483	19.988	.000[c]
	Residual	257.289	312	.825		
	Total	372.672	319			
4	Regression	155.668	8	19.459	27.887	.000[d]
	Residual	217.004	311	.698		
	Total	372.672	319			

Table 31: Hierarchical Regression Analysis of Intent to Leave.

		Unstandardized Coefficients		Std. Coeff		
	Independent Variables	**B**	**Std. Error**	**Beta**	**t**	**Sig.**
1	(Constant)	2.560	.220		11.641	.000
	1.41 age? (years)	-.016	.006	-.176	-2.697	.007
	Tenure at Company	-.004	.007	-.041	-.621	.535
2	(Constant)	2.523	.461		5.474	.000
	1.41 age? (years)	-.013	.006	-.141	-2.262	.024
	Tenure at Company	-.011	.007	-.104	-1.664	.097
	SumDynamicFactor	-.010	.014	-.048	-.715	.475
	SumPsychosocialFactor	.098	.018	.313	5.317	.000
	SumComputerWorkFactor	-.076	.021	-.240	-3.570	.000
	SumAwkwardPostureFactor	-.006	.021	-.020	-.296	.767
3	(Constant)	4.038	.456		8.852	.000
	1.41 age? (years)	-.003	.005	-.029	-.495	.621
	Tenure at Company	-.016	.006	-.144	-2.533	.012
	SumDynamicFactor	.000	.012	-.001	-.021	.983
	SumPsychosocialFactor	.026	.019	.082	1.352	.177
	SumComputerWorkFactor	-.026	.020	-.081	-1.272	.204
	SumAwkwardPostureFactor	-.021	.019	-.068	-1.116	.265
	jobsattot	-.514	.062	-.493	-8.287	.000
4	(Constant)	2.485	.467		5.324	.000
	1.41 age? (years)	-.004	.005	-.040	-.756	.450
	Tenure at Company	-.012	.006	-.109	-2.066	.040
	SumDynamicFactor	-.012	.011	-.057	-1.011	.313
	SumPsychosocialFactor	.017	.017	.054	.980	.328
	SumComputerWorkFactor	-.035	.019	-.111	-1.880	.061
	SumAwkwardPostureFactor	-.018	.018	-.056	-.999	.319
	jobsattot	-.424	.058	-.407	-7.294	.000
	EOIaverage	.409	.054	.347	7.598	.000

Table 32: Hierarchical Regression of Dependent Variables

Hypothesis	Dependent Variable	Predictors	R^2	Adj. R^2	ΔR^2	ΔF
1	Physical Tiredness	Age, Tenure	0.004	-0.002	-	0.607
		Ergonomic Factor Scale	0.453	0.443	0.449	44.545
2	Mental Tiredness	Age, Tenure	0.043	0.037	-	7.368
		Ergonomic Factor Scale	0.139	0.124	0.096	8.776
3(a)	Job Satisfaction	Age, Tenure	0.061	0.056	-	1.694
		Ergonomic Factor Scale	0.354	.0342	0.293	29.496
3(b)	Job Satisfaction	Age, Tenure	0.059	0.053	-	10.063
		Tiredness Scale	0.195	0.184	0.136	19.149
4	Average Intent to Leave	Age, Tenure	0.040	0.034	-	6.080
		Ergonomic Factor Scale	0.158	0.142	0.118	9.764
		Job Satisfaction	0.310	0.294	0.152	19.988
		EOI	0.418	0.403	0.108	27.887

The Validation Model

Hypothesis 1: The analysis for the validation model was done in the similar method as described in the testing model. The analysis for hypothesis 1 yielded an R^2 value of 0.151. Age and tenure were not significant predictors for physical tiredness but the ergonomic factor scale emerged as significant with only psychosocial factor as the significant predictor of physical tiredness. Model summary, ANOVA and the regression analysis for hypothesis 1 are tabulated in the Table 33, 34 & 35.

Table 33: Model Summary of Physical Tiredness

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1(Age, Tenure)	.190	.036	.023	1.82211
2(Age, Tenure, Ergonomic Factor Scale)	.388	.151	.113	1.73546

Table 34: ANOVA of Physical Tiredness

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	17.620	2	8.810	2.654	.074[a]
	Residual	468.130	141	3.320		
	Total	485.750	143			
2	Regression	73.131	6	12.189	4.047	.001[b]
	Residual	412.619	137	3.012		
	Total	485.750	143			

Table 35: Hierarchical Regression Analysis of Physical Tiredness

Independent Variables		Unstandardized Coefficients		Std. Coeff	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	5.758	.507		11.357	.000
	1.41 age? (years)	.008	.013	.054	.583	.561
	Tenure at Company	.035	.020	.160	1.722	.087
2	(Constant)	3.155	1.264		2.497	.014
	1.41 age? (years)	.018	.013	.126	1.387	.168
	Tenure at Company	.025	.020	.114	1.247	.214
	SumDynamicWorkFactor	.030	.042	.083	.712	.477
	SumPsychosocialWorkFactor	.142	.049	.260	2.888	.005
	SumComputerWorkFactor	-.003	.050	-.007	-.065	.948
	SumAwkwardPostureFactor	.051	.054	.106	.931	.354

Hypothesis 2: The validation analysis of hypothesis 2 yielded an R^2 value of 0.056. None of the factors were found to be significant. Model summary, ANOVA and the regression analysis for hypothesis 1 are tabulated in the Tables 36, 37 & 39.

Table 36: Model Summary for Mental Tiredness

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1(Age, Tenure)	.112[a]	.013	-.002	1.11184
2(Age, Tenure, Ergonomic Factor Scale)	.237[b]	.056	.015	1.10284

Table 37: ANOVA for Mental Tiredness

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.207	2	1.104	.893	.412[a]
	Residual	173.065	140	1.236		
	Total	175.273	142			
2	Regression	9.863	6	1.644	1.352	.239[b]
	Residual	165.410	136	1.216		
	Total	175.273	142			

Table 38: Hierarchical Regression Analysis of Mental Tiredness

		Unstandardized Coefficients		Std. Coeff		
	Independent Variables	**B**	**Std. Error**	**Beta**	**t**	**Sig.**
1	(Constant)	8.489	.310		27.395	.000
	1.41 age? (years)	.011	.008	.122	1.293	.198
	Tenure at Company	-.011	.012	-.083	-.884	.378
2	(Constant)	8.716	.805		10.827	.000
	1.41 age? (years)	.009	.008	.107	1.116	.266
	Tenure at Company	-.003	.013	-.024	-.245	.807
	SumDynamicWorkFactor	-.011	.027	-.050	-.407	.684
	SumPsychosocialWorkFactor	-.071	.031	-.216	-2.271	.025
	SumComputerWorkFactor	.035	.032	.121	1.082	.281
	SumAwkwardPostureFactor	.042	.035	.146	1.213	.227

Hypothesis 3: **a)** The validation analysis yielded an R^2 value of 0.397. Age, tenure and the ergonomic factor scale emerged as significant with all the ergonomic factors except the dynamic work factor as the significant predictors of job satisfaction.. Model summary, ANOVA and the regression analysis for hypothesis 1 are tabulated in the Table 39, 40 & 41.

Table 39: Model Summary for Job Satisfaction - Ergonomic Scale

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1(Age, Tenure)	.322[a]	.104	.091	1.087
2(Age, Tenure & Ergonomic Factor Scale)	.630[b]	.397	.370	.905

Table 40: ANOVA for Job Satisfaction - Ergonomic Scale

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	19.086	2	9.543	8.082	.000[a]
	Residual	165.299	140	1.181		
	Total	184.384	142			
2	Regression	73.110	6	12.185	14.893	.000[b]
	Residual	111.274	136	.818		
	Total	184.384	142			

Table 41: Hierarchical Regression Analysis of Job Satisfaction - Ergonomic Scale

		Unstandardized Coefficients		Std. Coeff		
	Independent Variables	**B**	**Std. Error**	**Beta**	**t**	**Sig.**
1	(Constant)	2.335	.302		7.721	.000
	1.41 age? (years)	.031	.008	.351	3.901	.000
	Tenure at Company	-.032	.012	-.238	-2.649	.009
2	(Constant)	3.283	.659		4.980	.000
	1.41 age? (years)	.021	.007	.235	3.040	.003
	Tenure at Company	-.021	.010	-.159	-2.050	.042
	SumDynamicWorkFactor	.034	.022	.155	1.578	.117
	SumPsychosocialWorkFactor	-.123	.026	-.366	-4.812	.000
	SumComputerWorkFactor	.057	.026	.193	2.189	.030
	SumAwkwardPostureFactor	-.081	.028	-.275	-2.847	.005

b) The validation analysis yielded an R^2 value of 0.175. Age, tenure and the tiredness scale were all found to be significant with both physical and mental tiredness predicting were significant predictors for job satisfaction. Results of hierarchical regression for hypothesis 1 are tabulated in the Table 42, 43 & 44.

Table 42: Model Summary for Job Satisfaction - Tiredness Scale

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1(Age, Tenure)	.329[a]	.108	.095	1.084
2(Age, Tenure & Tiredness Scale)	.418[b]	.175	.150	1.050

Table 43: ANOVA for Job Satisfaction - Tiredness Scale

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	19.793	2	9.897	8.421	.000[a]
	Residual	163.359	139	1.175		
	Total	183.152	141			
2	Regression	31.966	4	7.991	7.242	.000[b]
	Residual	151.186	137	1.104		
	Total	183.152	141			

Table 44: Hierarchical Regression Analysis of Job Satisfaction - Tiredness Scale

Independent Variables		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.313	.302		7.655	.000
	1.41 age? (years)	.032	.008	.360	3.997	.000
	Tenure at Company	-.032	.012	-.239	-2.653	.009
2	(Constant)	1.531	.782		1.957	.052
	1.41 age? (years)	.031	.008	.347	3.950	.000
	Tenure at Company	-.025	.012	-.190	-2.143	.034
	Total Physical Tiredness	-.127	.049	-.204	-2.572	.011
	Total Mental Tiredness	.179	.080	.174	2.231	.027

Hypothesis 4: Hypothesis 4 tested the predictive ability of the ergonomic factor scale, job satisfaction and employment opportunity index for average intent to leave. The validation analysis yielded an R^2 value of 0.553. All four model steps were found to be significant with job satisfaction and employment opportunity index as the final significant predictors. Model summary, ANOVA and the regression analysis for hypothesis 1 are tabulated in the Tables 45, 46 &47.

Table 45: Model Summary for Intent to Leave

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1(Age, Tenure)	0.239	0.057	0.043	1.112
2(Age, Tenure, Ergonomic Factor Scale)	0.476[b]	0.227	0.191	1.022
3(Age, Tenure, Ergonomic Factor Scale, Job Satisfaction)	0.707[c]	0.500	0.473	0.825
4(Age, Tenure, Ergonomic Factor Scale, Job satisfaction and EOI)	0.744[d]	0.553	0.525	0.783

Table 46: ANOVA for Intent to Leave

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	10.001	2	5.001	4.045	0.020
	Residual	165.641	134	1.236		
	Total	175.642	136			
2	Regression	39.830	6	6.638	6.354	0.000
	Residual	135.812	130	1.045		
	Total	175.642	136			
3	Regression	87.884	7	12.555	18.455	0.000
	Residual	87.758	129	0.680		
	Total	175.642	136			
4	Regression	97.138	8	12.142	19.798	0.000
	Residual	78.504	128	0.613		
	Total	175.642	136			

Table 47: Hierarchical Regression Analysis of Intent to Leave

		Unstandardized Coefficients		Std. Coeff		
	Independent Variables	**B**	**Std. Error**	**Beta**	**t**	**Sig.**
1	(Constant)	2.844	0.329		8.647	0.000
	1.41 age? (years)	-0.024	0.009	-0.260	-2.737	0.007
	Tenure at Company	0.008	0.013	0.057	0.597	0.551
2	(Constant)	1.379	0.751		1.836	0.069
	1.41 age? (years)	-0.018	0.008	-0.192	-2.144	0.034
	Tenure at Company	0.002	0.012	0.016	0.175	0.862
	SumDynamicWorkFactor	-0.015	0.025	-0.068	-0.612	0.542
	SumPsychosocialWorkFactor	0.098	0.030	0.289	3.282	0.001
	SumComputerWorkFactor	0.007	0.030	0.024	0.234	0.815
	SumAwkwardPostureFactor	0.070	0.032	0.238	2.172	0.032
3	(Constant)	3.516	0.657		5.351	0.000
	1.41 age? (years)	-0.004	0.007	-0.039	-0.522	0.602
	Tenure at Company	-0.011	0.010	-0.085	-1.150	0.252
	SumDynamicWorkFactor	0.009	0.020	0.041	0.450	0.653
	SumPsychosocialWorkFactor	0.016	0.026	0.047	0.608	0.545
	SumComputerWorkFactor	0.046	0.025	0.156	1.880	0.062
	SumAwkwardPostureFactor	0.016	0.027	0.052	0.576	0.566
	jobsattot	-0.663	0.079	-0.670	-8.405	0.000
4	(Constant)	2.389	0.688		3.472	0.001
	1.41 age? (years)	-0.003	0.007	-0.029	-0.412	0.681
	Tenure at Company	-0.010	0.009	-0.076	-1.073	0.285
	SumDynamicWorkFactor	-0.002	0.020	-0.010	-0.121	0.904
	SumPsychosocialWorkFactor	0.011	0.025	0.033	0.448	0.655
	SumComputerWorkFactor	0.037	0.023	0.127	1.596	0.113
	SumAwkwardPostureFactor	0.023	0.026	0.076	0.880	0.380
	jobsattot	-0.611	0.076	-0.618	-8.036	0.000
	EOIaverage	0.300	0.077	0.238	3.884	0.000

CHAPTER 5: DISCUSSION AND CONCLUSIONS

Discussion

The present study documented the results of an employee retention survey that was given at two organizations: a healthcare organization (n=315) and a distribution center (n=196). A scale of physical, psychosocial and cognitive risk factors related to employee retention was developed by using exploratory and confirmatory analysis as the extraction tools. The final scale (i.e., the ergonomic factor scale) that was developed consisted of four factors: dynamic work, psychosocial work, computer work and awkward postures with a total of 14 items. The items with similar job nature (such as physically demanding or mentally demanding) grouped into one factor. The samples differed in the characteristics of the jobs because work in the health care center was mostly either administrative (such as clerks or receptionists) or physically demanding (such as nurses) and the work in the distribution center work involved physical exertion in various parts of the warehouse. The factors covered both the physical and psychosocial aspects of work.

Four hypotheses were developed related to the dependent variables physical tiredness, mental tiredness, job satisfaction and intent to leave. Hierarchical regression was used to determine the predictive nature of the ergonomic factor scale on each of the dependent variables. The analysis was done using two steps: 1) age and tenure were added 2) ergonomic factors were added. The data supported our hypothesis on physical tiredness. Presences of ergonomic risk factors led to physical tiredness. After controlling for age and tenure, all the four ergonomic factors were significant and explained 44.9%

of the observed variance in the physical tiredness in our testing model. Age and tenure did not predict physical tiredness. The validation model also demonstrated that ergonomic factor scale predicted physical tiredness, but with a very low R^2 value (0.151). Also, only the psychosocial risk factor was found to be a significant factor in the scale.

For mental tiredness, the testing and validation models were not consistent in their results. For the testing model, both the steps were significant. After controlling for age and tenure, the ergonomic factor scale was found to be significant. In the ergonomic factor scale, psychosocial work factor and the awkward posture factor were significant. Age did not predict mental tiredness but tenure was found to be significant in predicting mental tiredness. For the validation model, none of the factors were found to be significant. This discrepancy in the results might be due to the small sample size of the validation model.

Hypothesis 3a assumed that the exposure to risk factors can decrease the job satisfaction levels of a person and this is successfully demonstrated by our data. For the testing model, after controlling for age and tenure, all the four ergonomic factors were significant predictors and the model yielded an R^2 value of 0.354. Age was also found to be a significant predictor in job satisfaction and it is positively correlated to it, thereby indicating that higher is the age, the higher are the job satisfaction levels. In the validation model, age, tenure and the ergonomic scale were all found to be significant. All the factors in the ergonomic scale except the dynamic work factor were found to be significant in predicting job satisfaction. The results echo the findings from the literature that ergonomic friendly work environment directly or indirectly will lead to benefits such

as increased productivity, increases job satisfaction levels, reduced employee turnover and reduced injury costs (Hoy et al., 2005).

Hypothesis 3b assumed that the tiredness variables also predict job satisfaction. For the testing model, after controlling for age and tenure, the tiredness scale was found to be significant in predicting job satisfaction levels. In the tiredness scales, only physical tiredness predicted job satisfaction and mental tiredness was not found to be significant. For the validation model, both physical and mental tiredness were found to be significant. These findings support our hypothesized model (See Figure 1) which states that tiredness leads to job dissatisfaction and exposure to ergonomic risk factors may also lead to job dissatisfaction without making a person tired.

For intent to leave, it was hypothesized that after controlling for age, ergonomic factor scale, job satisfaction and employment opportunity index will predict intent to leave. The predictors were entered in 4 steps. In the testing model, all the steps were found to be significant and the model yielded an R^2 value of 0.418. In the ergonomic scale, only computer work factor was found to be significant. The validation model yielded the same results as the testing model. Ergonomic factor scale, job satisfaction and employment opportunity index were found to be significant predictors of intent to leave. The negative relationship between job satisfaction and intent to leave indicates that the higher are the job satisfaction levels, the lower are the intentions to leave. This result is consistent with findings from the literature that show a strong inverse relationship between job satisfaction level and intent to leave. Similarly, employment opportunity index bears a positive correlation with intent to leave which echoes findings from the

literature that the higher are the employment opportunities, the higher are the chances of quitting.

Implications

There are several implications from this study which can be recommended to the management as employee retention and productivity enhancement measures. The analysis on physical tiredness revealed that dynamic work factor and awkward posture factor have a large effect on physical tiredness when compared to the other factors. Dynamic work included activities such as walking, standing, prolonged sitting etc. and awkward postures included back flexion, lifting etc. These risk factors associated with the job environment can be improved through job interventions. Implementation of better machinery with less manual work and more automation could reduce hazards posed by dynamic jobs. Good communication systems and proper work flow techniques could reduce the amount of walking. Ergonomically designed computer work stations with proper seating arrangements could reduce the risk associated with sedentary computer jobs. Material handling lifting systems and the use of lumbar supports help in preventing back injuries. In our analysis on mental tiredness, it was found that psychosocial work and computer work factors are positively correlated to mental tiredness. Psychosocial work included less job autonomy, working amidst of distraction, short staff and time pressure. Better management techniques could reduce the problem of being short staffed and time pressure. Training and development opportunities and performance appraisals can be implemented by the company to reduce the stress at the work place. As revealed by our analysis, job characteristics may not lead to a higher level of tiredness, but they could

affect job satisfaction levels and hence intent to leave. Technological interventions could be made to streamline processes and reduce load and distraction.

Conclusion and Future Recommendations

Our study developed a measure of four ergonomic risk factors that prevail in a work place and can affect employee retention. The research also found that these physical and psychosocial risk lead to tiredness and their exposure lowers an employee's job satisfaction levels. Poor job satisfaction leads to intention to quit and with given ample opportunities outside, intent to leave grows higher. Our study found that older employees have higher levels of job satisfaction in comparison to younger employees and less intention to quit. Thus, by designing a healthy and stress free workplace, companies can retain their valuable experienced older employee talent and reduce their turnover metrics.

This study led to interesting results that suggest more studies to be completed. Future recommendations include 1) applying structural equation modeling techniques to test our proposed model, 2) determining the role of employee health in our hypothesized model by inclusion of a validated scale for employee health. 3) developing a study using actual job characteristics vs. self reports to validate self report data, 4) developing prospective studies with actual turnover data to determine whether the suggested interventions can reduce employee retention and 5) conducting job analysis by shift to determine the role of work shift on employee tiredness.

REFERENCES

Adams, G. A., & Beehr, T. A. (1998). Turnover and retirement: A comparison of their similarities and differences. *Personnel Psychology, 51*, 643-665.

Allen, D. G., Shore, L. M., & Griffeth, R. W. (2003). The role of perceived organizational support and supportive human resource practices in the turnover process. *Journal of Management, 29*(1), 99-118.

Allen, J. M., & Hart, M. (1998). Training older workers: Implications for HRD/HPT professionals. *Performance Improvement Quarterly, 11*(4), 91-102.

Amell, T. K., & Kumar, S. (2000). Cumulative trauma disorders and keyboarding work. *International Journal of Industrial Ergonomics, 25*(1), 69-78.

Amick III, B. C., Robertson, M. M., DeRango, K., Bazzani, L., & et al. (2003). Effect of office ergonomic intervention on reducing musculoskeletal symptoms. *Spine, 28*(24), 2706-2711.

Barrett, J., & Kirk, S. (2000). Running focus groups with elderly and disabled elderly participant. *Applied Ergonomics, 31*(6), 621-629.

Blatter, B. M., & Bongers, P. M. (2002). Duration of computer use and mouse use in relation to musculoskeletal disorders of neck or upper limb. *International Journal of Industrial Ergonomics, 30*(4-5), 295-306.

Blekesaune, M., & Solem, P. (2005). Working conditions and early retirement. *Research on Aging, 27*(1), 3-30.

Bohr, P. C. (2000). Efficacy of office ergonomics education. *Journal of Occupational Rehabilitation, 10*(4), 243-255.

Bongers, P. M., de Winter, C. R., Kompier, M. A., & Hildebrandt, H. (1993). Psychosocial factors at work and musculoskeletal disease: A review of the literature. *Scandinavian Journal of Work, Environment and Health, 19*(5), 297-312.

Boshuizen, H. C., Bongers, P. M., & Hulshof, C. T. J. (1990). Self-reported back pain in tractor drivers exposed to whole-body vibration. *International Archives of Occupational and Environmental Health, 62*(2), 109-115.

Bot, S. D. M., Terwee, C. B., van der Windt, D. A. W. M., Feleus, A., Bierma-Zeinstra, S. M., Knol, D. L., et al. (2004). Internal consistency and validity of a new physical workload questionnaire. *Occupational Environmental Medicine, 61*, 980-986.

Bovenzi, M., & Hulshof, C. T. J. (1998). An updated review of epidemiological studies on the relationship between exposure to whole-body vibration and low back pain. *Journal of Sound and Vibration, 215*(4), 595-611.

Brown, D. (2002). Workforce is aging but no need to panic. *Canadian HR Reporter, 15*(10), 1-11.

Burdrof, A. (1992). Exposure assessment of risk factors for disorders of the back in occupational epidemiology. *Scandinavian Journal of Work, Environment and Health, 18*, 1-9.

Carayon, P., Smith, M. J., & Haims, M. C. (1999). Work organization, job stress and work related musculoskeletal disorders. *Human Factors and Ergonomics Society, 41*(4), 644-663.

Carayon, P., & Smith, M. J. (2000). Work organization and ergonomics. *Applied Ergonomics, 31*(6), 649-662.

Carsten, J. M., & Spector, P. E. (1987). Unemployment, job satisfaction and employee turnover: A meta analytical test of the Muchinsky model. *Journal of Applied Psychology, 72*, 374-381.

Clement, D. (2004). Welcome to retirement: Now back to work. *Fedgazette, 16*(2), 8-10.

Coberly, S. (1983). Incentives for hiring older workers - are employers interested? *Aging & Work, 6*, 37-47.

Conway, F. T., Smith, M. J., Cahill, J., & LeGrande, D. (1996). Psychological mood state of tension and musculoskeletal pain. In O. Brown, & H. W. Hendrick (Eds.), *Human factors in organizational design and management.* (pp. 303-308). Amsterdam: Elsevier.

Cook, C., Burgess-Limerick, R., & Papalia, S. (2004). The effect of wrist rests and forearm support during keyboard and mouse use. *International Journal of Industrial Ergonomics, 33*(5), 463-472.

Costello, A. B., & Osborne, J. W. (2005). Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis. *Practical Assessment, Research & Evaluation., 10*(7), 1-9.

David, G. C. (2005). Ergonomic methods for assessing exposure to risk factors for work - related musculoskeletal disorders. *Occupational Medicine, 55*(3), 190-199.

DeStefano, T., Clark, H., Gavin, M., & Potter, T. (2006). The relationship between work environment factors and job satisfaction among rural behavioral health professionals. *Journal of Rural Community Psychology, 30*(2), 1-8.

Devereux, J. J., Vlachonikolis, I. G., & Buckle, P. W. (2002). Epidemiological study to investigate potential interaction between physical and psychosocial actors at work that may increase the risk of symptoms of musculoskeletal disorder of the neck and upper limb. *Occupational Environmental Medicine, 59*, 269-277.

Doering, M., Rhodes, S. R., & Schuster, M. (1983). *The aging worker: Research and recommendations.* Beverly Hills, CA: Sage.

Dohm, A. (2000). Gauging the labor force effects of retiring baby-boomers. *Monthly Labor Review, 123*(7), 17-25.

Dudley, S. E., & Delong, W. B. (2001). OSHA's ergonomics program standard and musculoskeletal disorders: An introduction. *Journal of Labor Research, 22*(1), 1-14.

Dul, J., & Karwowski, W. (2004). An assessment for rating scientific journals in the field of ergonomics and human factors. *Applied Ergonomics, 35*, 301-310.

Dychtwald, K., Erickson, T., & Morison, B. (2004). It's time to retire retirement. *Harvard Business Review, 82*(3), 48-57.

Eisenberg, D. (2000). The coming job boom: The help-wanted ads may look thin-but thanks to aging baby boomers, that's about to change. *Time, 159*, 40.

Fabrigar, L. R., Wegener, D. T., MacCallum, R. C., & Strahan, E. J. (1999). Evaluating the use of exploratory factor analysis in psychological research. *Psychological Methods, 4*(3), 272-299.

Faucett, J., & Rempel, D. (1994). VDT-related musculoskeletal symptoms: Interactions between work posture and psychosocial work factors. *American Journal of Industrial Medicine, 26*, 597-612.

Ferguson, S. A., Marras, W. S., & Burr, D. (2005). Workplace design guidelines for asymptomatic vs. low-back-injured workers. *Applied Ergonomics, 36*(1), 85-95.

Feyer, A., Herbison, P., Willamson, A. M., de Silva, I., Mandryk, J., Hendrie, L., et al. (2000). The role of physical and psychological factors in occupational low back pain: A prospective cohort study. *Occupational Environmental Medicine, 57*, 116-120.

Fitz-enz, J. (1997). It's costly to lose good employees. *Workforce, 50*, 50-60.

Floyd, F. J., & Widaman, K. F. (1995). Factor analysis in the development and refinement of clinical assessment instruments. *Psychological Assessments, 7*(3), 286-299.

Ford, J. K., MacCallum, R. C., & Tait, M. (1986). The application of exploratory factor analysis in applied psychology: A critical review and analysis. *Personnel Psychology, 39*, 291-314.

Frank, F. D., Finnegan, R. P., & Taylor, C. R. (2004). Race for talent: Retaining and engaging the workers in the 21st century. *Human Resource Planning, 27*(3), 12-25.

Frost, M. (2002). When generations collide. *HR Magazine, 47.*

Gaertner, S. (1999). Structural determinants of job satisfaction and organizational commitment in turnover model. *Human Resource Management Review, 9*(4), 479-493.

Garnitz, R. N. (2002). Semiretirement: A practical retirement for boomers. *Employee Benefits Journal, 27*(2), 51-53.

Gordon, M. E., & Johnson, W. A. (1982). Seniority: A review of its legal and scientific standing. *Personnel Psychology, 35*, 255-280.

Griffeth, R., & Hom, P. (1988). A comparison of different conceptualizations of perceived alternatives in turnover research. *Journal of Organizational Behavior, 9*, 103-111.

Griffeth, R. W., Hom, P. W., & Gaertner, S. (2000). A meta-analysis of antecedents and correlates of employee turnover: Update, moderator tests, and research implications for the next millennium. *Journal of Management, 26*(3), 463-488.

Griffeth, R. W., Steel, R. P., Allen, D. G., & Bryan, N. (2005). The development of a multidimensional measure of job market cognitions. *Journal of Applied Psychology, 90*(2), 335-349.

Hagberg, M., & Sundelin, G. (1986). Discomfort and load on the upper trapezius muscle when operating a word processor. *Ergonomics, 29*(12), 1637-1745.

Hagberg, M. B., Silverstein, R., Wells, R., Smith, M. J., Hendrick, H. W., Carayon, P., et al. (1995). *Work related musculoskeletal disorders (WMSDs): A reference book for prevention.* London: Taylor & Francis.

Hanisch, K. A. (1995). Behavioral families and multiple causes: Matching complexity of responses to complexity of antecedent. *Current Directions in Psychological Science, 4*, 156-162.

Hansson, G. A., Balogh, I., Bystrom, J. U., Ohlsson, K., Nordander, C., Asterland, P., et al. (2001). Questionnaire versus direct technical measurements in assessing postures

and movements of the head, upper back, arms and hands. *Scandinavian Journal of Work, Environment and Health, 27*(1), 30-40.

Hedge, J. W., Borman, W. C., & Lammlein, S. E. (2006). The aging workforce: Realities, myths, and implications for organizations. *Journal of Occupational Rehabilitation, 18*(1), 102-102.

Hellman, C. M. (1997). Job satisfaction and intent to leave. *The Journal of Social Psychology, 137*(6), 677-689.

Hinkin, T. R. (1999). A brief tutorial on the development of measures for use in survey questionnaires. *Organizational Research Methods, 1*(1), 104-121.

Hom, P. W., Caranikas-Walker, F., Prussia, G. E., & Griffeth, R. W. (1992). A meta-analytical structural equation analysis of a model of employee turnover. *Journal of Applied Psychology, 77*(6), 890-909.

Hoozemans, M. J. M., Beek, A. V. D., Fringsdresen, M. H. W., Dijk, F. J. H. V., & Woude, L. H. V. V. D. (1998). Pushing and pulling in relation to musculoskeletal disorders: A review of risk factors. *Ergonomics, 41*(6), 757-781.

Hoy, J., Mubarak, N., Nelson, S., Sweerts de Landas, M., Magnusson, M., Okunribido, O., et al. (2005). Whole body vibration and posture risk factors for low back pain among fork lift drivers. *Journal of Sound and Vibration, 284*(3-5), 933-946.

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6*(1), 1-55.

Hutchens, R. M. (1988). Do job opportunities decline with age? *Industrial and Labor Relations Review, 42*(1), 89-99.

Ijmker, S., Huysmans, M., Blatter, B. M., van der Beek, A. J., van Machelen, W., & Bongers, P. M. (2006). Should office workers spend fewer hours at their compute? A systematic review of the literature. *Occupational Environmental Medicine, 7*(55), 1-9.

Inman, D. F., & Inman, R. A. (2004). Coping with the impending labor shortage. *Journal of Organizational Culture, Communications and Conflict, 8*(1), 1-9.

International Ergonomics Association. (n.d). Retrieved January 15, 2009, from http://www.iea.cc/

Izzo, J. B., & Withers, P. (2002). Winning employee-retention strategies for today's health care organizations. *Healthcare Financial Management, 56*(6), 52-57.

Janwantanakul, P., Pensri, P., Jiamjarasrangsri, V., & Singsongsook, T. (2008). Prevalence of self-reported musculoskeletal symptoms among office workers. *Occupational Medicine, 58*, 436-438.

Juul-Kristensen, B., & Jensen, C. (2005). Self-reported workplace related ergonomic conditions as prognostic factors for musculoskeletal symptoms: The "BIT" follow up study on office workers. *Occupational Environmental Medicine, 62*(3), 188-194.

Kacmar, K. M., & Ferris, G. R. (1989). Theoretical and methodological considerations in the age-job satisfaction relationship. *Journal of Applied Psychology, 74*(2), 201-207.

Karasek, R. A., Jr. (1979). Job demands, job decision latitude, and mental strain: Implications for job redesign. *Administrative Science Quarterly, 24*(2), 285-308.

Kelsey, J. (1982). *Epidemiology of musculoskeletal disorders.* New York: Oxford University Press.

Klitzman, S., & Stellman, J. M. (1989). The impact of the physical environment on the psychological well-being of office worker. *Social Science & Medicine, 29*(6), 733-742.

Kniss, B. (2005). *Employee engagement - a review of most current research.* http://www.insala.com/Articles/employee-development/employee-engagement-a-review-of-the-most-current-research.asp

Kumashiro, M. (2000). Ergonomic strategies and actions for achieving productive use of an aging work-force. *Ergonomics, 43*(7), 1007-1018.

Lambert, E. G., Hogan, N. L., & Barton, S. M. (2001). The impact of job satisfaction on turnover intent: A test of a structural measurement model using a national sample of workers. *The Social Science Journal, 38*, 233-250.

Landsbergis, P. A., Schnall, P. L., Warren, K., Pickering, T. G., & Schwartz, J. E. (1994). Association between ambulatory blood pressure and alternative formulations of job strain. *Scandinavian Journal of Work, Environment and Health, 20*(5), 349-363.

Lee, S. Y., & Brand, J. L. (2005). Effects of control over office workspace on perceptions of the work environment and work outcome. *Journal of Environmental Psychology, 25*(3), 323-333.

MacDonald, L. A., Karasek, R. A., Punnett, L., & Scharf, T. (2001). Covariation between workplace physical and psychosocial stressors: Evidence and implications for occupational health research and prevention. *Ergonomics, 44*(7), 696-718.

Mak, B. L., & Sockel, H. (2001). A confirmatory factor analysis of IS employee motivation and retention. *Information & Management, 38*(5), 265-276.

Marras, W. S., Lavender, S. A., Leurgans, S. E., Fathallah, F. A., Ferguson, S. A., Allread, W. G., et al. (1995). Biomechanical risk factors for occupationally related low-back disorder. *Ergonomics, 38*(2), 377-410.

McLaney, M. A., & Hurrell, J. A., Jr. (1988). Control, stress and job satisfaction in Canadian nurses. *Work & Stress, 2*(3), 217-224.

Mermin, G. B. T., Johnson, R. W., & Murphy, D. P. (2007). Why do boomers plan to work longer? *Journal of Gerontology, 62B*(5), 286-294.

Mobley, W., Griffeth, R., Hand, H., & Meglino, B. (1979). Review and conceptual analysis of employee turnover process. *Psychological Bulletin, 86*, 493-522.

Mobley, W. H. (1977). Intermediate linkages in the relationship between job satisfaction and employee turnover. *Journal of Applied Psychology, 62*(2), 237-240.

Mobley, W. H., Halmer, S. O., & Hollingsworth, A. T. (1978). An evaluation of precursors of hospital employee turnover. *Journal of Applied Psychology, 63*, 408-414.

Morgan, D. L. (1997). *Focus groups as qualitative research.* (2nd ed.). Thousand Oaks: Sage Publications.

Moyers, P. A., & Coleman, S. D. (2004). Adaption of older worker to occupational challenges. *Work, 22*, 71-78.

Mueller, C., Boyer, E., Price, J., & Iverson, R. (1994). Employee attachment and noncoercive conditions of work. *Work and Occupations, 21*(179), 212.

National Institute of Occupational Safety and Health (NIOSH). (2000). Organization of work: http://www.cdc.gov/niosh/topics/workorg/tools/

Nunnaly, J. C. (1978). *Psychometric theory* (2nd ed.). New York: McGraw-Hill.

O'Neill, G. L. (1998). Managing performance and remuneration. In M. Patrickson, & L Hartmann (Eds.), *Managing an ageing workforce* (pp. 170-179). Warriewood: Business and Professional Publishing.

Piktialis, D., & Morgan, H. (2003). The aging of the U.S workforce and its implications for employers. *Compensation and Benefits Review, 35*(1), 57-63.

Pope, D. P., Silman, A. J., Cherry, N. M., Pritchard, C., & Macfarlane, G. (1998). Validity of a self completed questionnaire measuring the physical demands of work. *Scandinavian Journal of Work, Environment and Health, 24*(5), 376-385.

Price, J. L. (1997). Handbook of organizational measurement. *International Journal of Manpower, 18*, 303-558.

PriceWaterhouseCoopers. (2004). Expecting sales growth, CEOs cite worker retention as critical to success. March 15.

Patrick, P., & Whitman, D. (2006). Topics in aging: Income of Americans age 65 and older, 1969 to 2004.Washington DC: Congressional Research Service.

Ramlall, S. (2003). Managing employee retention as a strategy for increasing organizational competitiveness. *Applied HRM Research, 8*(2), 63-72.

Reise, S., Waller, N. G., & Comrey, A. L. (2000). Factor analysis and scale revision. *Psychological Assessments, 12*(3), 287-297.

Rhodes, S. R. (1983). Age-related differences in work attitudes and behavior: A review and conceptual analysis. *Psychological Bulletin, 93*, 328-367.

Roper, K. O., & Yeh, D. C. (2007). Ergonomic solutions for an aging workforce. *Journal of Facilities Management, 5*(3), 172-178.

Roznowski, M., & Hulin, C. (1992). The scientific merit of valid measures of general constructs with special reference to job satisfaction and job withdrawal. In C. Cranny, P.Smith & E.Stone (Eds.), *Job satisfaction: How people feel about their jobs and how it affects their performance* (pp. 123-163). New York: Lexington Books.

Salancik, G. R., & Pfeffer, J. (1977). An examination of needs-satisfaction models of job attitudes. *Administrative Science Quarterly, 22*, 427-456.

Santos, J.R.A. (1999). Cronbach's Alpha: A tool for assessing the reliability of scales. *Journal of Extension*, 37(2).

Schmitt, N., Colligan, M., & Fitzgerald, M. (1980). Unexplained physical symptoms in eight organizations: Individual and organizational analysis. *Journal of Occupational Psychology, 53*(4), 305-317.

Schwartz, J. E., Pickering, T. G., & Landsbergis, P. A. (1996). Work-related stress and blood pressure: Current theoretical models and considerations from a behavioral medicine perspective. *Journal of Occupational Psychology, 1*, 287-310.

Shacklock, K., & Brunetto, Y. (2005). Employees' perceptions of the factors affecting their decision to retire. *International Journal of Organizational Behavior, 10*(5), 740-756.

Shur, D. D. (2006). Exploratory or confirmatory factor analysis? *Proceedings of the 31st Annual SAS Users Group International Conference,* San Francisco, California.

Smith, M. J., & Carayon, P. (1996). Work organization, stress, and cumulative trauma disorders. In S.D. Moon, & S.L. Sauter (Eds.), *Beyond biomechanics: Psychosocial aspects of musculoskeletal disorders in office work* (pp. 23-42). London: Taylor & Francis.

Spielholz, P., Silverstein, B., Morgan, M., Checkoway, H., & Kaufman, J. (2001). Comparison of self report, video observation and direct measurement methods for upper extremity musculoskeletal disorder physical risk factors. *Ergonomics, 44*(6), 588-613.

Sullivan, S. E., & Duplaga, E. A. (1997). Recruiting and retaining older workers for the new millennium. *Business Horizons, 40*(6), 65-69.

Swisher, L. L., Beckstead, J. W., & Bebeau, M. J. (2004). Factor analysis as a tool for survey analysis using a professional role orientation inventory as an example. *Physical Therapy, 84*(9), 784-799.

Talaga, J. A., & Beehr, T. A. (1995). Are there gender differences in predicting retirement decisions? *Journal of Applied Psychology, 80*(1), 16-28.

Tett, R. P., & Meyer, J. P. (1993). Job satisfaction, organizational commitment, turnover intention and turnover: Path analyses based on meta-analytical findings. *Personnel Psychology, 46*, 259-293.

Toomingas, A., Theorell, T., Michalsen, H., & Nordemar, R. (1997). Associations between self related psychosocial work conditions and musculoskeletal symptoms and signs. *Scandinavian Journal of Work, Environment and Health, 23*, 130-139.

Toossi, M. (2004). Labor force projections to 2012: The graying of the U.S. workforce. *Monthly Labor Review, 127*(2), 37-57.

Toossi, M. (2005). Labor force projections to 2014: Retiring boomers. *Monthly Labor Review, 128*(November), 25-44.

Trinkoff, A. M., Brady, B., & Nielsen, K. (2003). Workplace prevention and musculoskeletal injuries in nurses. *Journal of Nursing Administration, 33*(3), 153-158.

Vadlamani, T., Schwerha, D., & Griffeth, R. W. (2009). Multidimensional scale for ergonomic risk factors related to employee retention of aging workforce. *Proceedings of the Institute of Industrial Engineers Annual Conference and Expo,* Miami, FL.

van der Beek, A. J., & Frings-Dresen, M. H. (1998). Assessment of mechanical exposure in ergonomic epidemiology. *Occupational Environmental Medicine, 55*, 291-299.

Van Yoder, S., & Goldberg, B. (2002). Coping with the graying workforce. *Financial Executive, 18*(1), 26-29.

Viikari-Juntura, E., Rauas, S., Martikainen, R., Kuosma, E., Riihimaki, H., Takala, E., et al. (1996). Validity of self-reported physical work load in epidemiological studies on musculoskeletal disorders. *Scandinavian Journal of Work, Environment and Health, 22*, 251-259.

Wahlstrom, J. (2005). Ergonomics, musculoskeletal disorders and computer work. *Occupational Medicine, 55*, 168-176.

Waldman, D. A., & Avolio, B. J. (1986). A meta analysis if age differences in job performance. *Journal of Applied Psychology, 71*(1), 33-38.

Warren, N. (2001). Work stress and musculoskeletal disorder etiology: The relative roles of psychosocial and physical risk factors. *Work, 17*(3), 221-234.

Waters, T. R., Putz-Anderson, V., Garg, A., & Fine, L. J. (1993). Revised NIOSH equation for the design and evaluation of manual lifting tasks. *Ergonomics, 36*(7), 749-776.

Westgard, R. H., & Winkel, J. (1997). Ergonomic intervention research for improved musculoskeletal health: A critical review. *International Journal of Industrial Ergonomics, 20*, 463-500.

Wilson, M. G., Dejoy, D. M., Vandenberg, R. J., Richardson, H. A., & Mcgrath, A. L. (2004). Work characteristics and employee health and well being: Test of a model of healthy work organization. *Journal of Occupational and Organizational Psychology, 77*(4), 565-588.

APPENDIX A: ORIGINAL SURVEY COPY OF HEALTH CARE ORGANIZATION

Employee Retention Perceptions Questionnaire

Please read the following letter completely before starting the survey:

Dear Employee:

You have been selected to participate in a survey designed to learn what employees at this organization believe are the important factors related to retention and retirement. The information obtained from this survey will enable management to improve employee retention, work conditions, and work organization.

This is not a test. There are no right answers. The only right answers are your honest and thoughtful replies. The information obtained will be used to better understand reasons for employee retention at this organization. We have tested the survey and expect it to take approximately 15 minutes. We utilized focus group research to determine the types of questions needed to help us thoroughly understand this issue.

PROTECTION OF PRIVACY

The following is furnished to explain why the information is requested and the general uses that the information may be used for:

The purpose of this survey is to better understand employees' perceptions and to ultimately improve the quality of work life for employees. The survey data will be used for research purposes only. Your individual responses are COMPLETELY CONFIDENTIAL. Summarized data (e.g., averages, percentages), which do not contain individual identifiers, may be provided to management for uses related to improving policies and practices. Participation in the survey is voluntary. No penalty will be imposed for failure to respond to the survey or any particular question. However, in order to obtain and accurate picture of the working environment, your participation in this survey is important, encouraged, and greatly appreciated.

Your cooperation is sincerely appreciated. If you have any questions or concerns about this survey, please contact Diana Schwerha at Ohio University (Schwerha@ohio.edu).

Sincerely yours,

Employee Retention Perceptions Questionnaire
Ohio University

I understand that the completion of this form has been done voluntarily and is evidence of my consent. I understand that this information may be used in future publications.

Category 1: Job Characteristics

To what extent does your job require you to work in the following conditions each day? Please circle the number that applies to the amount of time that you spend in each condition (your hours may add up to more than 8)

1=not at all 2=< 2 hours 3=2-4 hours 4=4-6 hours 5=> 6 hours

1.1 Standing	1 2 3 4 5
1.2 Prolonged sitting mainly only in one posture	1 2 3 4 5
1.3 Walking (to and from tasks, offices, etc.)	1 2 3 4 5
1.4 Kneeling	1 2 3 4 5
1.5 Typing and/or using a mouse	1 2 3 4 5
1.6 Working on a computer	1 2 3 4 5
1.7 Lifting objects less than 20 pounds	1 2 3 4 5
1.8 Lifting objects more than 20 pounds	1 2 3 4 5
1.9 Working in heat	1 2 3 4 5
1.10 Working in cold	1 2 3 4 5
1.11 Experiencing whole-body vibration	1 2 3 4 5
1.12 Experiencing hand-arm vibration	1 2 3 4 5
1.13 Performing repetitive manual tasks	1 2 3 4 5
1.14 Working with arms above the shoulders	1 2 3 4 5
1.15 Working with back flexed	1 2 3 4 5
1.16 Speaking on phone (without headset)	1 2 3 4 5
1.17 Speaking on phone (with headset)	1 2 3 4 5
1.18 Working in static postures (e.g. postures don't change)	1 2 3 4 5
1.19 Working on tasks that requires frequent wrist flexion	1 2 3 4 5
1.20 Working in the midst of distraction	1 2 3 4 5
1.21 Working under time pressure (administrative tasks)	1 2 3 4 5
1.22 Working under time pressure (manual tasks)	1 2 3 4 5
1.23 Working in confined space	1 2 3 4 5
1.24 Working on tasks that are short staffed	1 2 3 4 5
1.25 Working on jobs where I have little control	1 2 3 4 5

For the following statements, please use the scale listed below and circle the correct answer:

1=strongly disagree 2=disagree 3=not sure 4=agree 5=strongly agree

1.26 I would describe my job as physically demanding	1 2 3 4 5
1.27 I would describe my job as mentally demanding	1 2 3 4 5
1.28 I am usually physically tired when I finish my work day	1 2 3 4 5
1.29 I am usually mentally tired when I finish my work day	1 2 3 4 5

1.30 How many hours do you work each week at this job?

1) Less than 10 _____
2) 10-20_____
3) 20-30_____
4) > 40_____

1.31 What is your current job title?

_____

1.32 In what type of work are you employed?

1. Medical ____
2. Clerical ____
3. Management___ _
4. Retail_____ __
5. Service_____ _
6. Manufacturing_ __
7. Financial_____ _
8. Legal_____
9. Teaching__ ___
10. Distribution ___
11. Professional (other)_____

1.33 What shift do you normally work?

1. Day ___ **3**.Afternoon ____
2. Night ___ **4**.Varied ____

How long have you been employed at this company?

1.34 Years: ___ **1.35** Months: ___

How many years have you been employed full-time outside the home?

1.36 Years: ____**1.37** Months: ___

How many years have you been employed part-time outside the home?

1.38 Years: ____ **1.39** Months: ___

1.40 At what age do you expect to retire? _____

1.41 What is your age? (years) _____

1.42.Do you supervise employees?

2) YES **1**) NO

Category 2: Possible Changes to the Worksite that Could Encourage Retention
Below is a list of events that have been thought to facilitate employee retention. Please read each event and rate its importance to you for remaining in this organization.

0 not applicable
1 extremely unimportant
2 very unimportant
3 unimportant
4 neutral
5 important
6 very important
7 extremely important

2.1 Reducing the amount of weight lifted each day	0 1 2 3 4 5 6 7
2.2 Reducing my exposure to vibration at work	0 1 2 3 4 5 6 7
2.3 Being able to change my posture between sitting and standing	0 1 2 3 4 5 6 7
2.4 Improving my software so that it is easier to use	0 1 2 3 4 5 6 7
2.5 Improving the ergonomics of my workstation (or work tasks) so that I am more comfortable	0 1 2 3 4 5 6 7
2.6 Improving the ergonomics of my workstation (or work tasks) in order to reduce the risk of injury	0 1 2 3 4 5 6 7
2.7 Knowing that adequate training is given equally to employees	0 1 2 3 4 5 6 7
2.8 Believing that older employees have the potential for advancement in this company	0 1 2 3 4 5 6 7
2.9 Participating in training where I can spend more time practicing	0 1 2 3 4 5 6 7
2.10 Participating in training that is given in small groups (less than 10 people)	0 1 2 3 4 5 6 7
2.11 Being given training for job enrichment	0 1 2 3 4 5 6 7
2.12 Changing my work shift	0 1 2 3 4 5 6 7
2.13 Being given better tools to allow me to perform my work	0 1 2 3 4 5 6 7
2.14 Better management	0 1 2 3 4 5 6 7
2.15 Having a window in my office	0 1 2 3 4 5 6 7
2.16 Being able to work at least one day from home	0 1 2 3 4 5 6 7
2.17 Having flex-time	0 1 2 3 4 5 6 7
2.18 Having more flexible leave options	0 1 2 3 4 5 6 7
2.19 Having more frequent breaks during the day	0 1 2 3 4 5 6 7
2.20 Having longer breaks during the day	0 1 2 3 4 5 6 7
2.21 Working fewer hours per day	0 1 2 3 4 5 6 7
2.22 Having more control over my tasks	0 1 2 3 4 5 6 7
2.23 Reducing the pace of my work	0 1 2 3 4 5 6 7

2.24 Having more assistance to help me complete tasks	0 1 2 3 4 5 6 7
2.25 Being able to work with fewer distractions	0 1 2 3 4 5 6 7

Category 3: Perceptions about Working/Retirement

For the following statements, please use the scale listed below and circle the correct answer:

1=strongly disagree 2=disagree 3=not sure 4=agree 5=strongly agree

3.1I will remain working as long as I am healthy	1 2 3 4 5
3.2I will remain working even if I can afford to quit	1 2 3 4 5
3.3I will remain working as long as family commitments do not require my full-time attention	1 2 3 4 5
3.4I believe that job characteristics influence one's decision to remain or to leave	1 2 3 4 5
3.5 My job provides me with a feeling of personal accomplishment	1 2 3 4 5
3.6I value my job	1 2 3 4 5
3.7I believe that my employer values my work	1 2 3 4 5
3.8I expect to retire from this job	1 2 3 4 5
3.9I have hobbies that I would like to spend more time on	1 2 3 4 5
3.10 I believe that work context (factors relating to your completion of work, such as scheduling, hours, physical demands, cognitive demands, or work organization) could be a significant factor in an employee's decision to remain on the job	1 2 3 4 5
3.11 I believe that work context contributes to health, and health could be a significant factor in an employee's decision to remain on the job	1 2 3 4 5
3.12 I have a defined benefit retirement plan	1 2 3 4 5
3.13 I have a defined contribution retirement plan	1 2 3 4 5
3.14 My current job does not offer any type of retirement plan	1 2 3 4 5

Category 4: Intention to Quit

1 = no chance 2 = 25% chance 3 = 50% chance 4 = 75% chance 5 = 100% chance

4.1 What are the chances that you will leave this organization during the next 12 months?	1 2 3 4 5

1 = definitely not 2 = probably not 3 = uncertain 4 = probably yes 5 = definitely yes

4.2 I intend to leave this organization during the next 12 months.	1 2 3 4 5

4.3 If you were to leave this organization would it be to (please circle one answer):

1) Obtain a new full-time job
2) Obtain a new part-time job
3) Retire and not work at all
4) Retire from this organization, but continue to work full-time
4) Retire from this organization, but continue to work part-time
5) Leave and go back to school for training for a different job

Category 5: Work and Organizational Context Factors

Below is a list of events that people said would facilitate their retention in this organization. Please read each event and rate its importance to you for remaining in this organization.

1 extremely unimportant
2 very unimportant
3 unimportant
4 neutral
5 important
6 very important
7 extremely important

5.1 Improvement in Benefits	1 2 3 4 5 6 7
5.2 Receiving a significant bonus	1 2 3 4 5 6 7
5.3 New group of people to work with	1 2 3 4 5 6 7
5.4 Improvement in work environment	1 2 3 4 5 6 7

5.5 Transfer to a new department	1 2 3 4 5 6 7
5.6 Work with a different boss	1 2 3 4 5 6 7
5.7 Hiring of additional personnel to reduce workload	1 2 3 4 5 6 7
5.8 Hiring of more reliable personnel	1 2 3 4 5 6 7
5.9 Improvement in co-worker relationships.	1 2 3 4 5 6 7
5.10 Significant pay increase	1 2 3 4 5 6 7
5.11 Management to overhaul	1 2 3 4 5 6 7
5.12 Change in management	1 2 3 4 5 6 7
5.13 Improvement in the consistency of staffs' behavior	1 2 3 4 5 6 7
5.14 Better communication	1 2 3 4 5 6 7
5.15 The resolution of departmental/interpersonal conflicts	1 2 3 4 5 6 7
5.16 Improve/ offer tuition reimbursement	1 2 3 4 5 6 7
5.17 Offer/improve day care assistance	1 2 3 4 5 6 7
5.18 Offer/improve health care	1 2 3 4 5 6 7
5.19 Better vacation policies	1 2 3 4 5 6 7
5.20 More challenging work	1 2 3 4 5 6 7
5.21 Less micro-management by supervisors	1 2 3 4 5 6 7
5.22 A job that keeps me thinking	1 2 3 4 5 6 7
5.23 More responsibility	1 2 3 4 5 6 7
5.24 Meeting with supervisors to participate in workplace improvements	1 2 3 4 5 6 7
5.25 Working as a team with colleagues and top management	1 2 3 4 5 6 7
5.26 Opportunity to go to college	1 2 3 4 5 6 7
5.27 Rehiring of valued employees	1 2 3 4 5 6 7
5.28 Caring and concerned leadership	1 2 3 4 5 6 7
5.29 Improvement in the cleanliness of the work environment	1 2 3 4 5 6 7
5.30 A better working environment	1 2 3 4 5 6 7
5.31 Closer to home	1 2 3 4 5 6 7
5.32 Training to make advancement an attainable goal	1 2 3 4 5 6 7

5.33 My superiors would be let down if I left	1 2 3 4 5 6 7
5.34 Better job security	1 2 3 4 5 6 7
5.35 Better retirement benefits	1 2 3 4 5 6 7
5.36 Getting rid of unqualified supervisors	1 2 3 4 5 6 7
5.37 Training programs that foster improvement in unqualified supervisors	1 2 3 4 5 6 7
5.38 Change in policies that are not stupid and petty	1 2 3 4 5 6 7
5.39 Management keeps its promises	1 2 3 4 5 6 7
5.40 Opportunity to learn new skills on the job	1 2 3 4 5 6 7
5.41 Promotion	1 2 3 4 5 6 7
5.42 Recognition of dedication and effort	1 2 3 4 5 6 7
5.43 Opportunity for advancement	1 2 3 4 5 6 7
5.44 A troublesome coworker leaves	1 2 3 4 5 6 7
5.45 Allow flex time	1 2 3 4 5 6 7
5.46 Laziness (learning a new job requires effort)	1 2 3 4 5 6 7
5.47 Some duties taken away	1 2 3 4 5 6 7
5.48 Teleworking/telecommuting	1 2 3 4 5 6 7
5.49 Consistent enforcement of policies	1 2 3 4 5 6 7
5.50 Better manager/supervisor training	1 2 3 4 5 6 7

Category 6: Wellness Programs

Please circle the answer that best describes your opinion about the following statements.

1=strongly disagree 2=disagree 3=not sure 4=agree 5=strongly agree

6.1 I am interested in receiving information on healthy eating	1 2 3 4 5
6.2 I am interested in smoking cessation programs	1 2 3 4 5
6.3 I am interested in participating in stress reduction programs	1 2 3 4 5
6.4 I would like to have better access to a company (or company sponsored) gym	1 2 3 4 5
6.5 I would like to have access to a personal trainer	1 2 3 4 5
6.6 I would like to have information on healthy recipes	1 2 3 4 5
6.7 I would like to get information on parenting tips	1 2 3 4 5

6.8 I would like to receive help with assisting with older parents	1 2 3 4 5
6.9 I would re-consider staying or leaving my job because of the wellness programs offered in my company	1 2 3 4 5
6.10 The presence of a wellness program would influence my decision to accept a job offer	1 2 3 4 5

Category 7: Job Satisfaction Measure
Please circle the answer that best describes your opinion about the following statements.

1=strongly disagree 2=disagree 3=not sure 4=agree 5=strongly agree

7.1 I feel fairly satisfied with my present job	1 2 3 4 5
7.2 Most days am enthusiastic about my work	1 2 3 4 5
7.3 Each day at work seems like it never ends	1 2 3 4 5
7.4 I find real enjoyment in my work	1 2 3 4 5
7.5 I consider my job to be rather unpleasant	1 2 3 4 5

Category 8: Employment Opportunity Index
Please circle the answer that best describes your opinion about the following statements. This is a 7 point scale.

1=strongly disagree 2 = moderately disagree 3=disagree
4= neither agree nor disagree 5=agree 6 = moderately agree 7=strongly agree

8.1 I have a far reaching "network" of contacts, which could help me find out about their job opportunities.	1 2 3 4 5 6 7
8.2 If I looked for a job, I would probably wind up with a better job than the one I have now.	1 2 3 4 5 6 7
8.3 By and large, the jobs I could get if I left here are superior to the job I have now.	1 2 3 4 5 6 7
8.4 There simply aren't very many jobs for people like me in today's job market.	1 2 3 4 5 6 7
8.5 Given my qualifications and experience, getting a new job would not be very hard at all.	1 2 3 4 5 6 7
8.6 I can think of a number of organizations that would probably offer me a job if I was looking.	1 2 3 4 5 6 7
8.7 I have contacts in other companies who might help me line up a new job.	1 2 3 4 5 6 7
8.8 Most of the jobs I could get would be an improvement over my present circumstances.	1 2 3 4 5 6 7
8.9 Right now, I have a job offer "on the table" from another employer, if I choose to take it.	1 2 3 4 5 6 7
8.10 I have found a better alternative than my present job.	1 2 3 4 5 6 7
8.11 My work and/or social activities tend to bring me in	

contact with a number of people who might help me line up a new job.	1 2 3 4 5 6 7
8.12 I am unable to move to another place of residence now even if a better job came along.	1 2 3 4 5 6 7
8.13 My spouse's career makes it very difficult to for me to leave.	1 2 3 4 5 6 7
8.14 There are factors in my personal life (e.g., school age children, relatives, etc.) which make it very difficult for me to leave in the near future.	1 2 3 4 5 6 7

Category 9: Demographic Information

9.1 Indicate your Sex (circle one).
1) Male 2) Female

9.2 What is your racial or ethnic group membership? (circle one)
1) African American
2) Hispanic
3) Caucasian (white)
4) Asian or Pacific Islander
5) American Indian or Alaskan Native
6) Middle Eastern
7) Other

9.3 What is your marital status? (circle one)
1) Single (never married)
2) Married
3) Separated
4) Divorced
5) Widowed

9.4 How much formal education have you completed? (circle one)
1) 8 years or less
2) 9 to 11 years (some high school)
3) High school graduate
4) 1 to 2 years college or technical school
5) 3 years college
6) College graduate
7) Some graduate education
8) Masters degree
9) Ph.D. degree

9.5 Roughly, what is your total real income at the present time from this company before taxes and other deductions are made?
(Round to the nearest thousand; e.g., $24,400 = $24,000; $24,500 = $25,000)
$_____

YOU HAVE NOW COMPLETED THE QUESTIONNAIRE. Thank you for your help in this study. Before you enclose the envelope and seal it please page through the questionnaire to make sure you have answered all the questions. If you have any questions about the questionnaire or its uses, please call: Diana Schwerha, 740-593-1577.

PLEASE USE THE SPACE BELOW TO MAKE ANY COMMENTS THAT YOU FEEL MIGHT BE USEFUL TO MANAGEMENT IN IMPROVING YOUR JOB.

AGAIN, ANY COMMENTS WILL NOT BE IDENTIFIED WITH YOU INDIVIDUALLY

APPENDIX B: ORIGINAL SURVEY COPY OF THE DISTRIBUTION CENTER

Employee Retention Perceptions Questionnaire

Please read the following letter completely before starting the survey:

Dear Employee:

You have been selected to participate in a survey designed to learn what employees at this organization believe are the important factors related to retention and retirement. The information obtained from this survey will enable management to improve employee retention, work conditions, and work organization.

This is not a test. There are no right answers. The only right answers are your honest and thoughtful replies. The information obtained will be used to better understand reasons for employee retention at this organization. We have tested the survey and expect it to take approximately 15 minutes. We utilized focus group research to determine the types of questions needed to help us thoroughly understand this issue.

PROTECTION OF PRIVACY

The following is furnished to explain why the information is requested and the general uses that the information may be used for:

The purpose of this survey is to better understand employees' perceptions and to ultimately improve the quality of work life for employees. The survey data will be used for research purposes only. Your individual responses are COMPLETELY CONFIDENTIAL. Summarized data (e.g., averages, percentages), which do not contain individual identifiers, may be provided to management for uses related to improving policies and practices. Participation in the survey is voluntary. No penalty will be imposed for failure to respond to the survey or any particular question. However, in order to obtain and accurate picture of the working environment, your participation in this survey is important, encouraged, and greatly appreciated.

Your cooperation is sincerely appreciated. If you have any questions or concerns about this survey, please contact Diana Schwerha at Ohio University (Schwerha@ohio.edu).

Sincerely yours,

Employee Retention Perceptions Questionnaire
Ohio University

I understand that the completion of this form has been done voluntarily and is evidence of my consent. I understand that this information may be used in future publications.

Category 1: Job Characteristics

To what extent does your job require you to work in the following conditions each day? Please circle the number that applies to the amount of time that you spend in each condition (your hours may add up to more than 8)

1=not at all 2=< 2 hours 3=2-4 hours 4=4-6 hours 5=> 6 hours

1.1 Standing	1 2 3 4 5
1.2 Prolonged sitting mainly only in one posture	1 2 3 4 5
1.3 Walking (to and from tasks, offices, etc.)	1 2 3 4 5
1.4 Kneeling	1 2 3 4 5
1.5 Typing and/or using a mouse	1 2 3 4 5
1.6 Working on a computer	1 2 3 4 5
1.7 Lifting objects less than 20 pounds	1 2 3 4 5
1.8 Lifting objects more than 20 pounds	1 2 3 4 5
1.9 Working in heat	1 2 3 4 5
1.10 Working in cold	1 2 3 4 5
1.11 Experiencing whole-body vibration	1 2 3 4 5
1.12 Experiencing hand-arm vibration	1 2 3 4 5
1.13 Performing repetitive manual tasks	1 2 3 4 5
1.14 Working with arms above the shoulders	1 2 3 4 5
1.15 Working with back flexed	1 2 3 4 5
1.16 Speaking on phone (without headset)	1 2 3 4 5
1.17 Speaking on phone (with headset)	1 2 3 4 5
1.18 Working in static postures (e.g. postures don't change)	1 2 3 4 5
1.19 Working on tasks that requires frequent wrist flexion	1 2 3 4 5
1.20 Working in the midst of distraction	1 2 3 4 5
1.21 Working under time pressure (administrative tasks)	1 2 3 4 5
1.22 Working under time pressure (manual tasks)	1 2 3 4 5
1.23 Working in confined space	1 2 3 4 5
1.24 Working on tasks that are short staffed	1 2 3 4 5
1.25 Working on jobs where I have little control	1 2 3 4 5

For the following statements, please use the scale listed below and circle the correct answer:

1=strongly disagree 2=disagree 3=not sure 4=agree 5=strongly agree

1.26 I would describe my job as physically demanding	1 2 3 4 5
1.27 I would describe my job as mentally demanding	1 2 3 4 5
1.28 I am usually physically tired when I finish my work day	1 2 3 4 5
1.29 I am usually mentally tired when I finish my work day	1 2 3 4 5

1.30 How many hours do you work each week at this job?

1. Less than 10 _____
2. 10-20 _____
3. 20-40 _____
4. > 40 _____

1.31. In what area of the DC are you employed?

1. Receiving ___
2. Full case ___
3. Split case ___
4. Manual Replenishment ___
5. Machine Stocking ___
6. Shipping ___
7. Maintenance/custodial ___
8. Other ___

1.32 What shift do you normally work?

1. Day ___ 3.Afternoon ____
2. Night___ 4.Varied ____

How long have you been employed at this company?

1.33 Years: _____ **1.34** Months: _____

How many years have you been employed full-time outside the home?

1.35 Years: _____ **1.36** Months: _____

How many years have you been employed part-time outside the home?

1.37 Years: _____ **1.38** Months: _____

1.39 At what age do you expect to retire? _____

1.40 What is your age? (Years) _____

1.41 Do you supervise employees?

2) YES **1)** NO

Category 2: Possible Changes to the Worksite that Could Encourage Retention
Below is a list of events that have been thought to facilitate employee retention. Please read each event and rate its importance to you for remaining in this organization.

0 not applicable
1 extremely unimportant
2 very unimportant
3 unimportant
4 neutral
5 important
6 very important
7 extremely important

2.1 Reducing the amount of weight lifted each day	0 1 2 3 4 5 6 7
2.2 Reducing my exposure to vibration at work	0 1 2 3 4 5 6 7
2.3 Being able to change my posture between sitting and standing	0 1 2 3 4 5 6 7
2.4 Improving my software so that it is easier to use	0 1 2 3 4 5 6 7
2.5 Improving the ergonomics of my workstation (or work tasks) so that I am more comfortable	0 1 2 3 4 5 6 7
2.6 Improving the ergonomics of my workstation (or work tasks) in order to reduce the risk of injury	0 1 2 3 4 5 6 7
2.7 Knowing that adequate training is given equally to employees	0 1 2 3 4 5 6 7
2.8 Believing that older employees have the potential for advancement in this company	0 1 2 3 4 5 6 7
2.9 Participating in training where I can spend more time practicing	0 1 2 3 4 5 6 7
2.10 Participating in training that is given in small groups (less than 10 people)	0 1 2 3 4 5 6 7
2.11 Being given training for job enrichment	0 1 2 3 4 5 6 7
2.12 Changing my work shift	0 1 2 3 4 5 6 7
2.13 Being given better tools to allow me to perform my work	0 1 2 3 4 5 6 7
2.14 Having a window in my office	0 1 2 3 4 5 6 7
2.15 Being able to work at least one day from home	0 1 2 3 4 5 6 7
2.16 Having flex-time	0 1 2 3 4 5 6 7
2.17 Having more flexible leave options	0 1 2 3 4 5 6 7
2.18 Having more control over my tasks	0 1 2 3 4 5 6 7
2.19 Being able to work with fewer distractions	0 1 2 3 4 5 6 7

Category 3: Perceptions about Working/Retirement

For the following statements, please use the scale listed below and circle the correct answer:

1=strongly disagree 2=disagree 3=not sure 4=agree 5=strongly agree

3.1 I will remain working as long as I am healthy	1 2 3 4 5
3.2 I will remain working even if I can afford to quit	1 2 3 4 5
3.3 I will remain working as long as family commitments do not require my full-time attention	1 2 3 4 5
3.4 I believe that job characteristics influence one's decision to remain or to leave	1 2 3 4 5
3.5 My job provides me with a feeling of personal accomplishment	1 2 3 4 5
3.6 I value my job	1 2 3 4 5
3.7 I believe that my employer values my work	1 2 3 4 5
3.8 I expect to retire from this job	1 2 3 4 5
3.9 I have hobbies that I would like to spend more time on	1 2 3 4 5
3.10 I believe that work context (factors relating to your completion of work, such as scheduling, hours, physical demands, cognitive demands, or work organization) could be a significant factor in an employee's decision to remain on the job	1 2 3 4 5
3.11 I believe that work context contributes to health, and health could be a significant factor in an employee's decision to remain on the job	1 2 3 4 5
3.12 I have a defined benefit retirement plan (this means that I know that given a certain length of employment that I will receive a certain amount of money each month during retirement)	1 2 3 4 5
3.13 I have a defined contribution retirement plan (this means that I know that I need to contribute to my retirement and that the amount of money that I receive during my retirement years will depend on the amount of money that was deposited into my account)	1 2 3 4 5
3.14 My current job does not offer any type of retirement plan	1 2 3 4 5

Category 4: Intention to Quit

1 = no chance 2 = 25% chance 3 = 50% chance 4 = 75% chance 5 = 100% chance

4.1 What are the chances that you will leave this organization during the next 12 months?	1 2 3 4 5

1 = definitely not 2 = probably not 3 = uncertain 4 = probably yes 5 = definitely yes

4.2 I intend to leave this organization during the next 12 months.	1 2 3 4 5

4.3 If you were to leave this organization would it be to (please circle one answer):

1) Obtain a new full-time job
2) Obtain a new part-time job
3) Retire and not work at all
4) Retire from this organization, but continue to work full-time
5) Retire from this organization, but continue to work part-time
6) Leave and go back to school for training for a different job

Category 5: Wellness Programs

Please circle the answer that best describes your opinion about the following statements.

1=strongly disagree 2=disagree 3=not sure 4=agree 5=strongly agree

5.1 I am interested in receiving information on healthy eating	1	2	3	4	5
5.2 I am interested in smoking cessation programs	1	2	3	4	5
5.3 I am interested in participating in stress reduction programs	1	2	3	4	5
5.4 I would like to have better access to a company (or company sponsored) gym	1	2	3	4	5
5.5 I would like to have access to a personal trainer	1	2	3	4	5
5.6 I would like to have information on healthy recipes	1	2	3	4	5
5.7 I would like to get information on parenting tips	1	2	3	4	5
5.8 I would like to receive help with assisting with older parents	1	2	3	4	5
5.9 I would re-consider staying or leaving my job because of the wellness programs offered in my company	1	2	3	4	5
5.10 The presence of a wellness program would influence my	1	2	3	4	5

decision to accept a job offer	

Category 6: Job Satisfaction Measure

Please circle the answer that best describes your opinion about the following statements.
1=strongly disagree 2=disagree 3=not sure 4=agree 5=strongly agree

6.1 I feel fairly satisfied with my present job	1 2 3 4 5
6.2 Most days am enthusiastic about my work	1 2 3 4 5
6.3 Each day at work seems like it never ends	1 2 3 4 5
6.4 I find real enjoyment in my work	1 2 3 4 5
6.5 I consider my job to be rather unpleasant	1 2 3 4 5

Category 7: Employment Opportunity Index

Please circle the answer that best describes your opinion about the following statements. This is a 7 point scale.
1=strongly disagree 2 = moderately disagree 3=disagree
4= neither agree nor disagree 5=agree 6 = moderately agree 7=strongly agree

7.1 I have a far reaching "network" of contacts, which could help me find out about their job opportunities.	1 2 3 4 5 6 7
7.2 If I looked for a job, I would probably wind up with a better job than the one I have now.	1 2 3 4 5 6 7
7.3 By and large, the jobs I could get if I left here are superior to the job I have now.	1 2 3 4 5 6 7
7.4 There simply aren't very many jobs for people like me in today's job market.	1 2 3 4 5 6 7
7.5 Given my qualifications and experience, getting a new job would not be very hard at all.	1 2 3 4 5 6 7
7.6 I can think of a number of organizations that would probably offer m a job if I was looking.	1 2 3 4 5 6 7
7.7 I have contacts in other companies who might help me line up a new job.	1 2 3 4 5 6 7
7.8 Most of the jobs I could get would be an improvement over my present circumstances.	1 2 3 4 5 6 7
7.9 Right now, I have a job offer "on the table" from another employer, if I choose to take it.	1 2 3 4 5 6 7
7.10 I have found a better alternative than my present job.	1 2 3 4 5 6 7
7.11 My work and/or social activities tend to bring me in contact with a number of people who might help me line up a new job.	1 2 3 4 5 6 7
7.12 I am unable to move to another place of residence now even if a better job came along.	1 2 3 4 5 6 7

7.13 My spouse's career makes it very difficult to for me to leave.	1 2 3 4 5 6 7
7.14 There are factors in my personal life (e.g., school age children, relatives, etc.) which make it very difficult for me to leave in the near future.	1 2 3 4 5 6 7

Category 8: Demographic Information

8.1 Indicate your Sex (circle one).

1) Male 2) Female

8.2 What is your racial or ethnic group membership? (circle one)

1) African American
2) Hispanic
3) Caucasian (white)
4) Asian or Pacific Islander
5) American Indian or Alaskan Native
6) Middle Eastern
7) Other

8.3 What is your marital status? (Circle one)

1) Single (never married)
2) Married
3) Separated
4) Divorced
5) Widowed

8.4 How much formal education have you completed? (circle one)

1) 8 years or less
2) 9 to 11 years (some high school)
3) High school graduate
4) 1 to 2 years college or technical school
5) 3 years college
6) College graduate
7) Some graduate education
8) Masters degree
9) Ph.D. degree

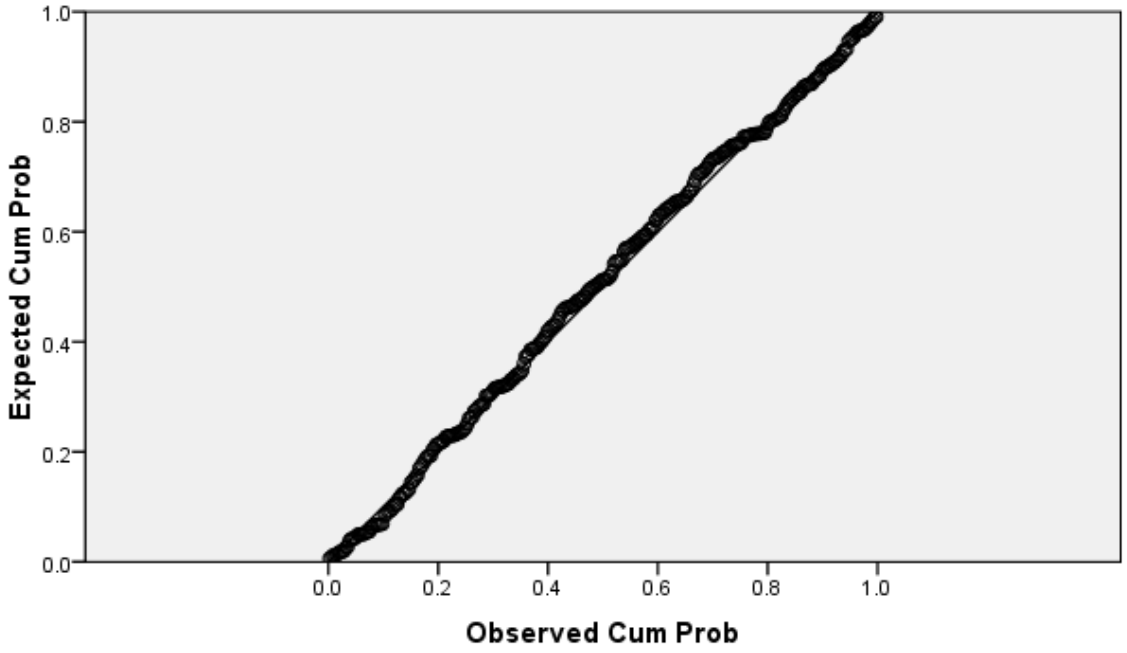
8.5 Roughly, what is your total real income at the present time from this company before taxes and other deductions are made?
(Round to the nearest thousand; e.g, $24,400 = $24,000; $24,500 = $25,000)
$_____

YOU HAVE NOW COMPLETED THE QUESTIONNAIRE. Thank you for your help in this study. Before you enclose the envelope and seal it please page through the questionnaire to make sure you have answered all the questions. If you have any questions about the questionnaire or its uses, please call: Diana Schwerha, 740-593-1577.

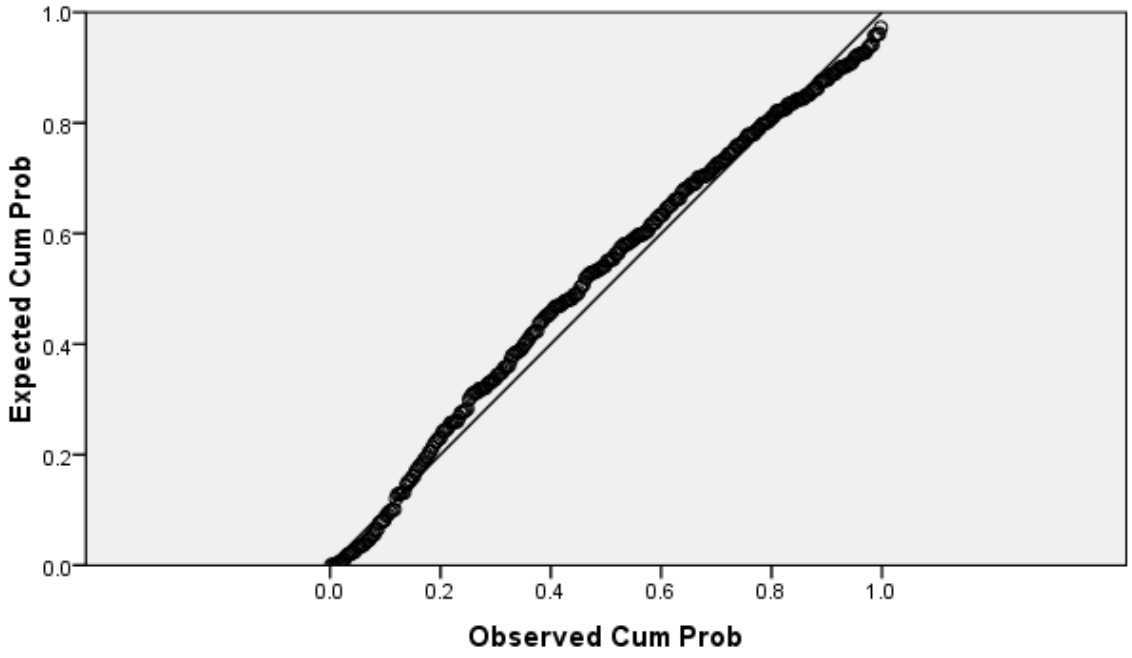
PLEASE USE THE SPACE BELOW TO MAKE ANY COMMENTS THAT YOU FEEL MIGHT BE USEFUL TO MANAGEMENT IN IMPROVING YOUR JOB. AGAIN, ANY COMMENTS WILL NOT BE IDENTIFIED WITH YOU INDIVIDUALLY.

APPENDIX C: NORMAL PROBABILITY PLOTS OF THE REGRESSION MODELS

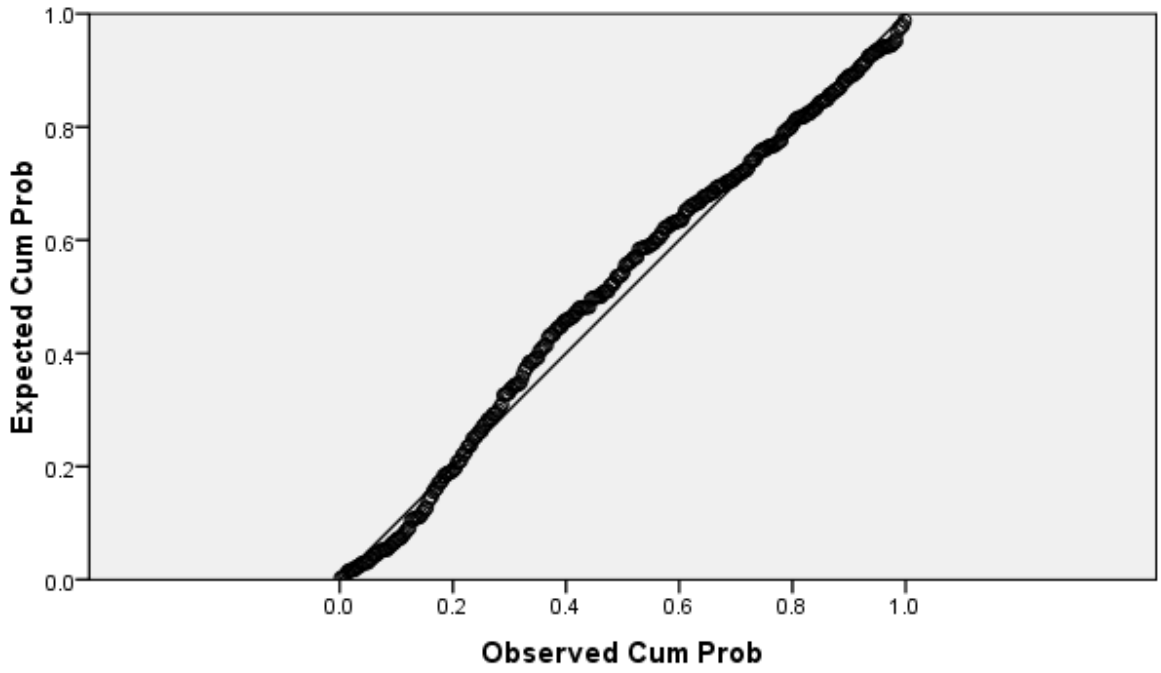
Model 1: Dependent Variable: Physical Tiredness



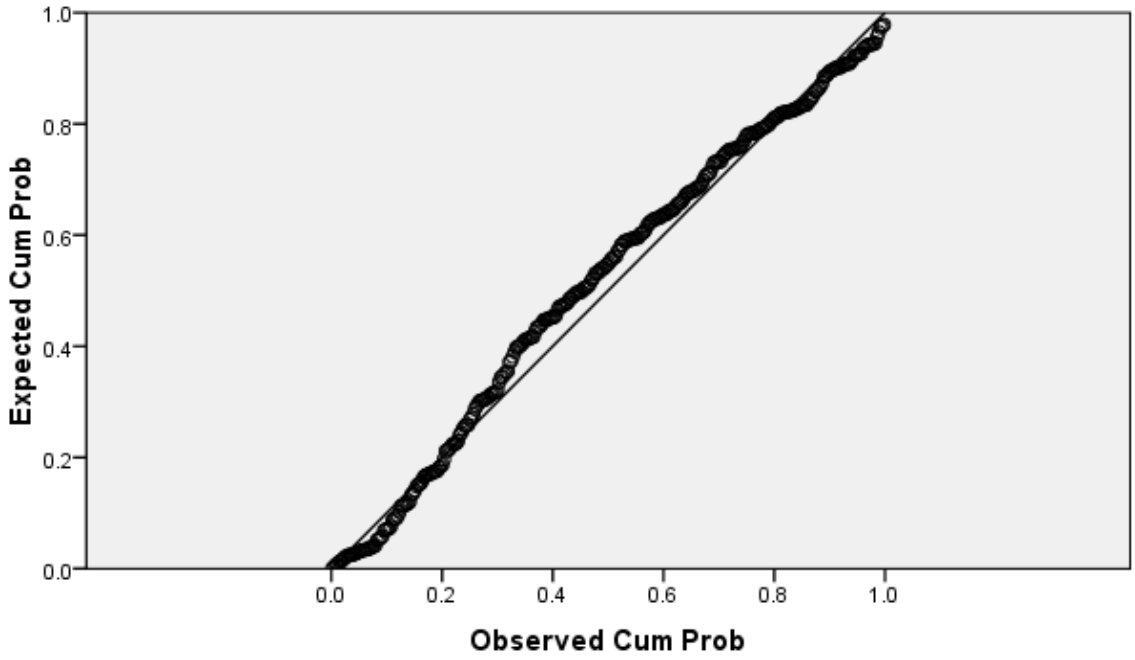
Model 2: Dependent Variable: Mental Tiredness



Model 3a: Dependent Variable: Job Satisfaction



Model 3b: Dependent Variable: Job Satisfaction



Model 4: Dependent Variable: Average Intent to Leave