Holistic Health Factors in the Workplace

Biophilia, Ergonomics and Exercise

by

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ABSTRACT

In an attempt to advocate body-conscious design and healing work environments, this research study of holistic health in the workplace explores cognitive, social and physical well-being in four small US offices that are between 1000 and 4000 square feet and employ three to twelve employees. Holistic health, as pursued in this research, includes social health, emotional health and physical health. These three factors of holistic health have been identified and investigated in this study: biophilia: peoples' love and affiliation with other species and the natural environment; ergonomics: the relationship between the human body, movement, the immediate environment and productivity; and exercise: exertion of the body to obtain physical fitness. This research study proposes that employees and employers of these four participating workplaces desire mobility and resources in the workplace that support holistic health practices involving biophilia, ergonomics, and exercise. Literature review of holistic health and the holistic health factors of this research topic support the idea that interaction with other species can be healing, ergonomic body-conscious furniture and equipment increase productivity, limit body aches, pains and health costs; and exercise stimulates the mind and body, increasing productivity.

This study has been conducted primarily with qualitative and flexible research approaches using observation, survey, interview and pedometer readings as methods for data collection. Two small corporate franchise financial institutions and two small private healthcare providers from both Arizona and Georgia participated in this study. Each office volunteered one employer and two employee participants.

Of the holistic health factors considered in these four case studies, this study found that a majority of participants equally valued emotional health, social health and physical health. A majority of participants declared a preference for workplace environments with serene natural environments with outdoor spaces and interaction with other species, work environments with body-conscious furniture, equipment and workstations, as well as exercise space and equipment. As these particular workplace environments affirmed value for elements of the factors biophilia, ergonomics and exercise, all three factors are considered valueable within the workplaces of these case studies. Furthermore, factors that were said to contribute to personal productivity in

participating workplaces were found as well as sacrifices that participants stated they would be willing to make in order to implement their preferred work environment(s). In addition, this study recorded and calculated average miles walked by participants in each workplace as well as existing incentives and descriptions of ideal work environments.

Implications of this research study involve interior design, industrial design and fashion design that can accommodate the desires of the four participating workplaces. Major design implications involve accommodating these particular workplaces to provide personnel with opportunities for holistic health in working environments. More specific implications of office related design involve providing access to natural environments, body-conscious equipment and spaces, as well as opportunities for exercise and social interaction. These elements of the factors biophilia, ergonomics and exercise were found to be said to contribute to cognitive, social and physical health.

To all workplace personnel

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Wallace, I know you cannot read (because you are a dog), but you deserve a thank you. Thank you for your patience and affection, and for taking me outside.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Chapter 1

INTRODUCTION

"The rhythm of life is when you experience your own body, mind and soul."

(Yogi tea bag, 2011)

Background

Frustrated by pain, a sedentary office worker is victim of constant aching. She works long uninterrupted hours typing and reading on a laptop computer. Working at an un-adjustable kitchen table in a stiff immobile wood chair, contact pressure eats away at the elbows and wrists. Pains gnaw on the pelvis and thighs; the feet and legs are restless. The ninety-degree angled back support accommodates a C slouch posture, crunching the diaphragm, ribs and lungs, limiting potential lung capacity. Long hours hunched over a laptop computer demand forward head posture, stiffen spinal curves; generate a screaming neck, tense shoulders and aching back. This picture describes a poorly configured ergonomic workstation.

Hunched over with a rolling spine and forward head posture deprives the diaphragm of full deep relaxing breaths. Long hours of sedentary work in an un-adjustable chair at an un-adjustable desk deprives vertebral discs of hydration and nutrient flow, causing compression of vertebral discs, damage to bones, joints and nerves in the back. Galen Cranz (1998) uncovered research evidence proving that "sitting in a chair itself generates physical problems and deforms the body" (p. 96). Accumulating a variety of evidence from multiple countries on the damage that sitting can cause, Cranz found that "sitting has been associated with numerous problems: back pain of all sorts, fatigue, varicose veins, stress, and problems with the diaphragm, circulation, digestion, elimination, and general body development" (p. 97). Not only affecting the body, poor ergonomics also affects the mind. Stiffness, arthritis, stooped posture, back pain, neck pain, insomnia, disc compression, loss of joint lubrication, nerve damage, carpel tunnel syndrome, anxiety, depression, obesity, and headaches are some possible health issues predicted for such working postures and behaviors. Yes, these are behaviors, subconscious, conscious, voluntary and involuntary; these assumed body positions are behaviors. These behaviors are found everywhere there are chairs—coffee shops, restaurants, homes, work, schools, play grounds, libraries, shopping mall, and the list

goes on; but such behaviors are primarily found in working environments such as schools and offices, where sedentary work is required. Such behaviors are instilled in children and carried through for a lifetime, beginning with preschool and continuing through to college and the office. These behaviors, however, can change for the better; they can change when design accommodates healthier behaviors, and healthier behaviors can only occur when people become aware of the existing problems and are motivated to fix them.

Although this student works long hours at a poor ergonomic workstation, she fortunately has the privilege to make her own work rules and schedule. She has the freedom to express her frustrations and alleviate her pains with spontaneous moments of exercise, stretch breaks, yoga, spontaneous friendly neighbor visits, dog walks, furry affection, invigorating aromas and music. She has a porch where she can enjoy an oasis of plants, sunshine, bird songs and a view of neighbors enjoying cool pool water. Despite the poor ergonomics, the affiliation with the natural outdoors and other species, opportunity and space for exercise help to create some type of inner balance, helping her to be productive and motivated to work.

This study can be introduced with a few of the words that instilled passion for this research from a few pages of The *Chair: Rethinking Culture, Body, and Design* by Galen Cranz (1998). Through her study of the chair, Cranz discovered that research suggests chair use deforms the body, which will be discussed further in the literature review section about ergonomics. She describes her ideal work environment in the chapter "Beyond Interior Design". Her ideal workspace does not just alter working positions; it caters to the overall well-being of users through design that addresses emotional, social and physical aspects of health. Environmental influences such as music, windows, fresh smells, moderate temperatures and the physical environment manipulate people emotionally and physically (Sternberg, 2009). Furniture arrangements and spaces can either inhibit or encourage social interaction amongst office personnel.

In Cranz's ideal office space she considers features that appeal to the body's senses—hearing, sight, smell and temperature—with music, windows, fresh smells and moderate temperatures. "When you open the door, a Mozart violin concerto comes over the sound system. What you see before you is a spacious office, with natural light streaming in through the windows on three sides.

Since there is no off-gassing from walls, carpet, or furniture, and because the windows are operable, a fresh smell pervades the place. In order to minimize the difference between the temperature indoors and out, the office temperature will be 68 degrees in the winter and 75 degrees in the summer" (p. 218).

Cranz's ideal workspace takes ergonomics and body movement into consideration with a variety of options for body postures. Furniture, equipment and space accommodate various body positions, movement and support productivity. Besides interior design, fashion design is even considered with suggestions for comfortable flexible clothing. Such clothing does not restrict the body from movement if one wants to stretch out comfortably or participate in mild exercises. "You have a lot of postural options for working in this office. You can stand to lay out research data, articles, or slides. You can stand or squat in front of files to use them. Floor-to-ceiling bookshelves allow you to stretch up or squat down. You can prop books open on an eye-level-slanted shelf before you decide to move it to your workstation. As you survey the room, you experience a sense of being invited to work here because so many different work spaces have been designed to accommodate different activities. When you want to do some word processing, you can recline in a lounge chair with the keyboard on your lap and the screen mounted at an angle, like a hospital-room television set on an expandable arm. You could also choose to dictate to your computer standing or perched on a high stool. When standing, a chest-high surface within arm's reach allows you to take notes without bending your spine. All your associates in the office wear soft clothes in the natural fibers of silk, cotton, and wool, so they do not bind or restrict if the person wants to sit cross-legged on the padded platforms while discussing business. These yielding clothes also enable anyone who has a kink in the back to lengthen his or her spine by stretching out on the platforms for a few minutes" (p. 219-220).

Ergonomic furniture and exercise equipment are considered for multiple working positions, play and mild exercise. Such furniture and equipment would accommodate those who want to take quick breaks, stretch and tone their bodies, or energize themselves at work. "If you were a newcomer, the thing in the office that might make you most curious is related to exercise: a large inflated ball over which staff members occasionally draped themselves to promote flexibility of

the spine. Some sit on it in lieu of a stool. It also keeps children entertained when they visit. You might be equally intrigued by a cluster of three rings of Opsvik pedestals that support a variety of standing postures. An overhead bar for hanging and an inverter offer other opportunities to stretch your spine" (p. 220).

Access to the natural outdoors and natural elements such as balconies or water features support peoples' innate desire to be affiliated with the natural environment and other species (Kellert, et al., 1993). Outdoor space in workplaces can also be used by personnel for breaking and exercise. "You notice a set of French doors that lead onto a wooden deck or balcony, vine-covered. Down the steps is a pool or fountain. Sometimes people assume the rest position on the deck or exercise or eat or talk on the phone. Inside and outside are not that different—a Modernist's dream" (p. 220).

"But this vision need not remain a dream. Running throughout this study of the chair has been a call to action. First, honor your body; learn how to attend to it, and educate it to communicate with our culture. From this, develop your own ideal environments (p. 221). After reading Cranz's enlightening and innovative thoughts on her ideal workspace, I cannot help but desire the same type of work environment for myself and others.

Problem Statement

Do others share similar visions of such an ideal workspaces? Are others aware of their options, or even their abilities to question and request conditions to improve their well-being—health of their mind and body? Understanding that employees might feel threatened approaching employers with such demands; and understanding that the answers to such questions could provide companies and their workers with healthier policies and practices, as an unbiased outside design researcher I have begun to tackle what Cranz requests of her readers: "Identify what forces keep such visions of sensual rationality from becoming our cultural standard. And become your own advocate for body-conscious design" (1998, p. 221). Some say that such ideal workspaces are simply not possible; with that attitude they never will be.

In our Information Age, affluent people all over the world adapt to computer technology. Computers are ubiquitous, in our pockets, purses, offices, homes, schools, cars. People use

computers as encyclopedias, replacing books with computer monitors, key boards, mice, and hard drives. Not only do computers replace books, but they have also taken the place of physical activity—and human communication. Rather than physically delivering verbal or hand-written messages, people send emails or make phone calls. Telephones are mini-computers; they are even replacing desktops and laptops. With new stresses and cultural changes due to demands of computer technology, our workplaces evolve. People should not have to adapt to technology, technology should adapt to and for people.

With rapid implementation of widespread computer technology, it seems some people have forgotten their bodies. People cram information into their brains, an important and complicated organ; but many people neglect their muscles in today's age of Information Technology. With information and computer-technology demands in the workplace, employees and employers spend more time sitting at computers, reading display screens, going digital, taking work with them on mobile devices. Such demands can be stressful and harmful for the body and mind; however, relief can be found. Such things as: freedom to move between one social phase and another (from solitary work to group interaction), music, opportunities to engage in spontaneous social encounters, opportunity to engage in creativity, self-expression and exploration, appealing visual environments, exercise, space for body movements such as exercise stretching and a variety of working positions, furniture and equipment, personal accessories, plant life and association with other species, access to outdoor environments, and sensory variability can provide relief from everyday stresses and demands in the workplace (Clements-Croome, 2006).

Many people accept what space, environment, furniture and equipment they are given to work with without question. "It is what I am used to," "It is what I have always done," are common responses of people asked about why they do what they do. Why must we accommodate ourselves to poorly configured furniture, uncomfortable working positions and environments? I hope to improve these conditions. If people had opportunities to question, opportunities to request healthier choices, body—conscious and mind-conscious work environments designed for movement, multiple working positions and worker preferences, perhaps people would be happier, healthier, more positive, energized, motivated and more productive. This is analogous to the

argument for evidence-based design practices for health and healing environments; patients heal faster and hospitals have higher turnover rates when hospital design caters to patient desires and experience. Workplaces should perhaps design according to and cater to worker desires and experiences. Cranz and I believe this is what most many work environments need. After all, most working people spend the majority of their days at work.

Assumption

This research study proposes the assumption that employees and employers desire mobility and resources in the workplace that support holistic health practices involving biophilia, ergonomics and exercise. These factors have been found to be contributors to well-being and productivity (Gallagher, 1993; Tesitel, et al., 1993; Nelson, 1993; Waikar & Bradshaw, 1995; Cranz, 1998; McDonough & Braungart, 2002; Diener, King & Lyubomirsky, 2005; Grinde & Patil, 2009; Levine, 2009; Sternberg, 2009; Oseland, 2009; Congleton, 2010; International Ergonomics Association, 2010; Higgs & Pynt, 2010). Perhaps employees and employers will feel healthier emotionally, socially and physically in environments with access to natural environments, the outdoors, and spaces that take ergonomics and exercise into consideration. Holistic health factors considered for purposes of this research study are factors that pertain to emotional, social and physical well-being: biophilia, ergonomics, and exercise. This thesis suggests that biophilia, ergonomics, and exercise are factors that contribute to holistic health in the workplace (see Figure 1).
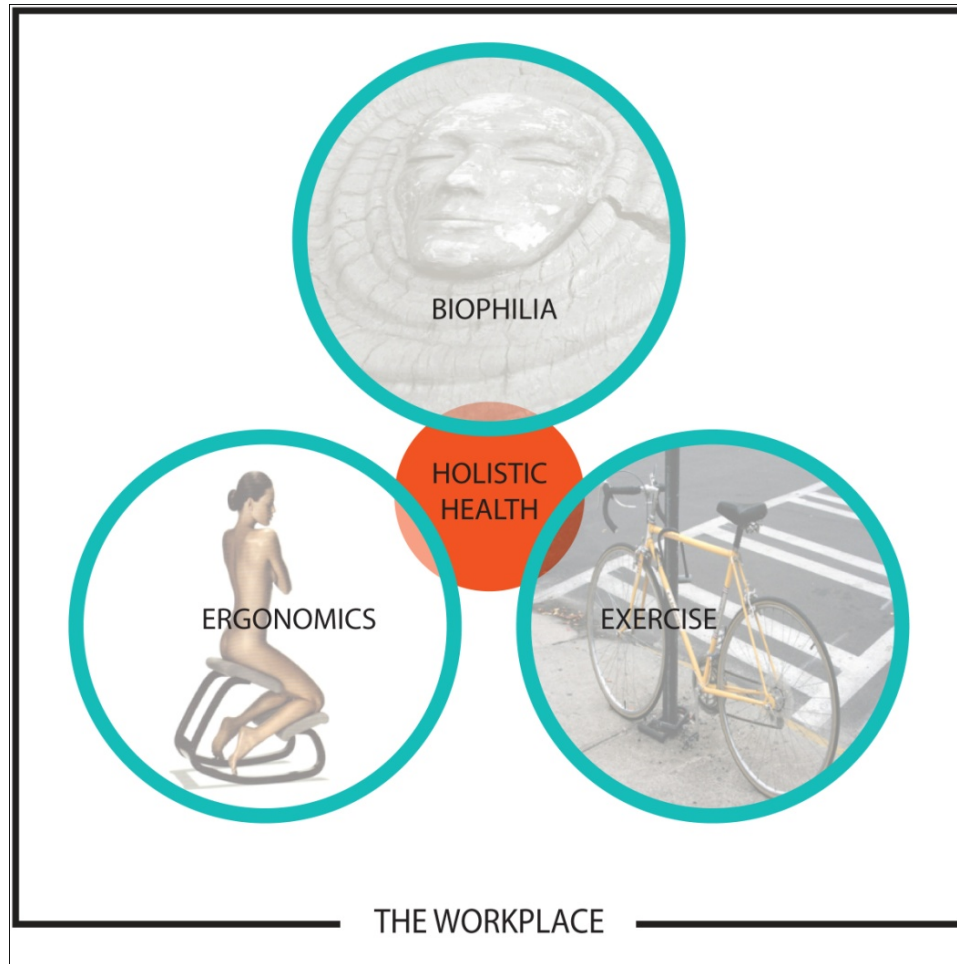
Figure 1. Primary areas of concentration for thesis study: conceptual framework

Justification and Significance

Studies of biophilia, ergonomics and exercise have been conducted; however, studies of such specific health factors implemented and incentivized in small US workplaces as well as employer and employee values and personal opinions associated with such factors have not been explored in depth. Research on biophilia supports the idea that interaction with other species can be healing, ergonomic body-conscious furniture and equipment increase productivity and limit body aches and pains and health costs, and exercise stimulates the mind and body, increasing productivity.

This research uncovered workplaces in North America that offer such amenities and related incentives. Pixar, IBM, PepsiCo, Chase, Johnson and Johnson, Glaxo-Smithkline, Wheeler Interests, IBM, Coors Brewing Co., and Walt Disney Co. are a few of the larger US companies

currently involved in implementing and enforcing holistic health practices into the workplace (Congleton, 2010). For example, as found on their website, PepsiCo began implementing global workplace wellness programs to promote health and wellness for their associates in 2004, called HealthRoads™, a part of their Sustainability Vision. This program helps participating associates of PepsiCo make informed decisions regarding healthcare as well as develop and sustain healthy behaviors with motivational incentives. Such behavioral changes involving HealthRoads™ primary focuses on diet, exercise and nutrition reduce health risks. Participants are encouraged to seek preventative care and work one-on-one with wellness coaches to manage existing health conditions. Tracking their wellness efforts, PepsiCo found that their wellness initiatives have slowed the rate of increased medical costs; for every dollar spent on workplace wellness during 2007, they saved approximately $3.45 on healthcare, reducing healthcare costs for PepsiCo and associates. In 2009, PepsiCo's HealthRoads™ program received external recognition with a Platinum award for Best Employers for Healthy Lifestyles. Many workplaces implementing and enforcing holistic health practices are larger companies, while many smaller companies are unaware or lack the means to implement such practices in their work environments. As literature review will show, many researchers argue that such amenities and opportunities contribute to well-being as well as productive performance and overall success and happiness for employees, employers and companies involved. Medical doctors, designers, neuroscientists, even t-shirts and tea bags support arguments for holistic health in the workplace.

The US Department of Labor, Employment Standards Administration promotes labor rights and employment standards with the objective of fostering economic and social equity for personnel health and well-being. In growing popular efforts to increase worker health, productivity and happiness, it makes sense to incorporate incentives and programs supporting holistic health into work environments. At the 2010 National Ergonomics Conference, Jerome, J. Congleton, PhD, spoke of the Healthy Workforce Act of 2009. Although "A resolution affirming the importance of exercise and physical activity as key components of a healthy lifestyle, including in combating obesity, reducing chronic disease, and lowering health care costs" was introduced and passed by Senate Mary 9, 2011, the Healthy Workforce Act of 2009 did not become law after

being introduced in April of 2009 (GovTrack). It is a bill to amend the Internal Revenue Code of 1986 to provide tax credit to employees for the costs of implementing wellness programs offering health promotion and preventative care (GovTrack.). It was proposed that a fifty percent tax credit for the costs of providing employees with a qualified wellness program would be granted to employers. A "qualified wellness program" is defined as a program certified by the Secretary of Health and Human Services and consists of a health awareness and education component, a behavioral change component, and a supportive environment component. In the Healthy Workforce Act of 2009, Congress stated its findings about the US workforce (Open Congress, 2011):

(1) The US has more than 12 million employers and approximately 135 million working adults.

(2) The use of effective worksite policies and programs can reduce health risks and improve the quality of life for the 135 million full-time and part-time workers in the United States.

(3) Workers spend more than one-third of their day on the job and, as a result, employers are in a unique position to promote the health and safety of their employees.

(4) Chronic diseases such as heart disease, stroke, cancer, obesity, and diabetes are among the most prevalent and costly worker health problems for most employers.

(5) The use by employers of effective worksite policies and programs can reduce health risks and improve the quality of life for their employees.

(6) The good health of workers is good for business because healthier workers miss less work, are more productive, and have lower health care costs.

Congress said it. People spend much of their lives at work, therefore; it is smart to begin and influence the implementations of healthy practices and lifestyles in workplaces. This research employs a subjective approach to draw attention to the workspace desires of employees and employers. Many people adapt to their work conditions and environments rather than question existing policies and conditions about their and others' personal well-being. Innovation is needed in workplaces, for the health and well-being of all who work. Innovation cannot occur without behavioral change; and as Bruce Mau (a designer and leader

of positive massive change) said at ASU's graduate symposium, "Exposed 2010: Designing for a world that is waiting": "Put out a consistent signal. Find the people who want to find you and who are interested in changing the world the same as you." (Exposed, 2010).

<div align="center">**Scope and Limitations**</div>

In an attempt to advocate body-conscious design, health and healing work environments, this research study of holistic health in the workplace explores emotional, social and physical well-being in small work environments through investigation of existing, lack of and desires for holistic health factors in four small North American offices that are between 1000 and 4000 square feet and employ three to twelve employees. Specific areas of concentration for this thesis study involve detailed elements of each factor—biophilia, ergonomics, and exercise (see Figure 2).
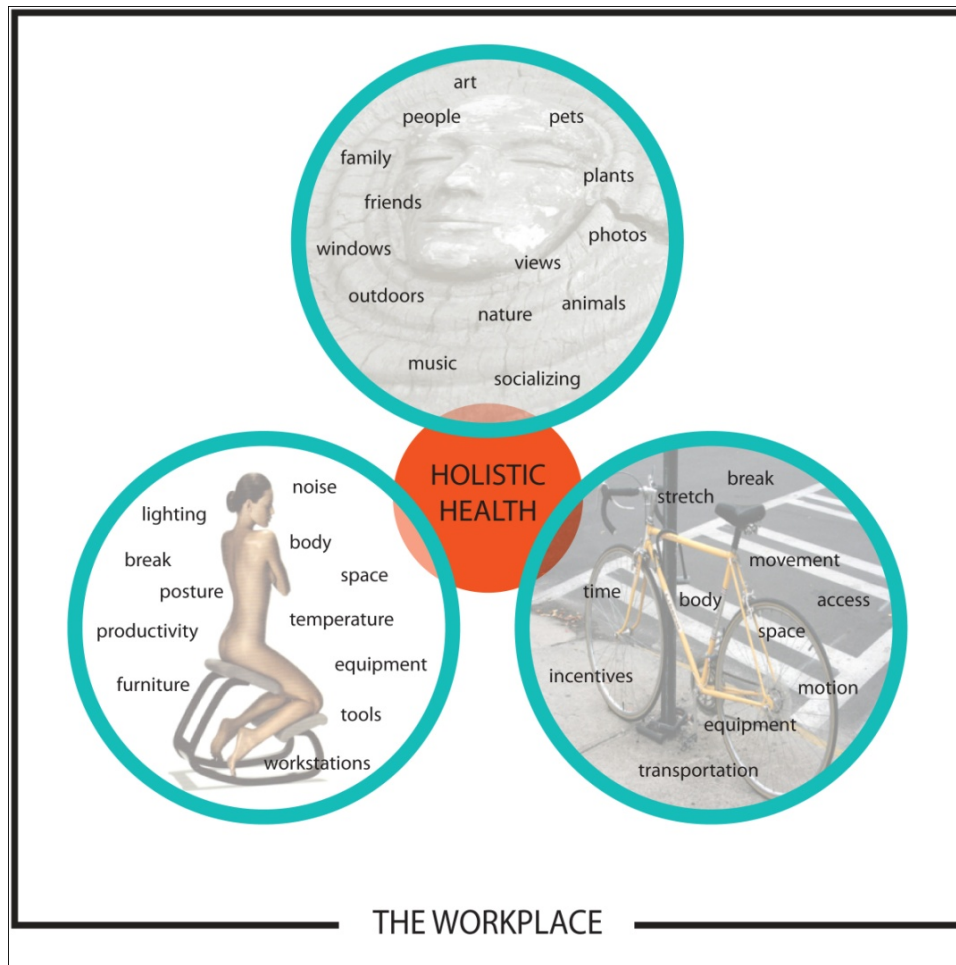
Figure 2. Elements of conceptual framework's holistic health factors

Health, happiness, productivity, motivation, and work performance of participants and offices were not measured with external measurements in this research study. Only miles walked were measured externally with pedometers. Measurements of holistic health factors in the workplace were collected using a subjective measure of self report by participants through surveys and interviews. Observations identified existing elements linked to the specific health factors, biophilia, ergonomics, and exercise, such as windows, plants, participant behaviors and workstations that existed or were taking place in participating workplaces. Comparison of participant opinions in surveys and interviews to observations and pedometer readings enhanced identification of holistic health factors and elements of such factors, providing transparency of inconsistencies within collected data.

Furthermore, it is important to note that participants' desires were recorded, not necessarily needs. To be clear, a goal of this research study was to acquire personal opinions regarding participants' desires for elements of the primary health factors: biophilia, ergonomics and exercise, in their workplaces through subjective measures of self report. Surveys and interviews were primarily analyzed to determine participants' desires in relation to the health factors of this research study. Some environmental psychologists, biologists and other researchers may claim these desires of elements of biophilia, ergonomics and exercise are actually human needs. Although biophilia, ergonomics and exercise constitute the basic human needs of emotional health, social health and physical health; and they can be categorized into Abraham Maslow's Hierarchy of Needs (1943), such as sense of belonging and self-actualization, this research study does not claim such desires as needs (Maslow's Hierarchy of Needs is discussed further in literature review). Further rigorous research can determine whether elements of the holistic health factors, biophilia, ergonomics and exercise, are deemed as human needs.

This research study officially began in Septemeber, 2010, and concluded seven months later. The data extensively noted in this thesis document was collected from survey responses and pedometer readings. Interview and observation methods conducted for each case study were done so to eliminate inconsistencies and provide extensive data for future research and other interested parties.

Although ergonomics was a variable in this research study, extensive ergonomic assessments of each office were not performed. Ergonomic assessments require a great deal of time and attention. Pages of ergonomic evaluations, questions and checklists are available from ergonomists and can also be found on the internet. The data collection process of this research study began prior to my attendance of the 2010 Ergonomics Conference and Exposition and attainment of ergonomic checklists. Appendix F represents an example of an ergonomic assessment checklist from Bowdoin College's Office of Environmental Safety. The Occupational Health and Safety Administration (OSHA) offers an ergonomic evaluations checklist online (see Appendix G) (list website reference).

Although this research study primarily focuses on sedentary behaviors and positions in the workplace, not all participants were required to perform strictly sedentary tasks. For example, two medical offices participated in this study; and medical offices do not require all employees to work in sedentary positions, due to the demands such as those of nurses and medical assistants.

The investigator was present for all twelve hours of office observations, and objectivity remained a primary goal. Sincere attempts were made to be unobtrusive, authentic reciprocated appreciation of process created friendly, trusting and comfortable relationships between participants and the investigator.

Conclusion

This chapter laid the groundwork for addressing three holistic health factors in the workplace: biophilia, ergonomics, and exercise. With an introduction of the topic's background, the problem statement and the assumption have been noted. The research was justified, and the significance, scope and limitations of the study were noted. The following chapters provide detailed descriptions of the research through literature review, methodology, and results of data analysis.

Chapter 2

REVIEW OF LITERATURE

Introduction

Numerous literature on topics of health, holistic health, emotional health, social health, psychological health, spiritual health, and ergonomics exist. This literature review attempts to share an assortment of information of topics related to this research study's focus, holistic health in workplaces. Holistic health encompasses a person's overall health. When a person's overall health is considered, any factors which contribute to a person's well-being are taken into account. All aspects of people's needs can be organized into cognitive, social and physical needs; these needs contribute to the whole of a person. Although alternative medicine also considers spiritual aspects when assessing a person's overall well-being, this research study does not attempt to include spiritual health in the factors of holistic health. Holistic health factors considered for purposes of this research study are factors that pertain to emotional, social and physical well-being: biophilia, ergonomics, and exercise. Literature review is organized into subchapters addressing: small sedentary workplaces, sedentary work, holistic health, biophilia, ergonomics, the chair, body and mind, exercise, environmental psychology, health and healing environments.

Television shows like *Rupert Bear* send positive messages to children, such as when Rupert was outside enjoying a picnic with his Professor; his Professor said: "Fresh air, sunshine and exercise…ahh…there's nothing like it!" (*Rupert Bear*, 1920). Documentaries explicating poor health practices, such as *Super Size me*, *Food Inc*, and *The Corporation*, and TV shows like *The Biggest Loser*, are quite popular today. People are expressing concerns for their well-being. Positive changes in the home and office in support of health and well-being are occurring slowly. Some high school physical fitness education programs are being enforced with more rigor and seriousness as the US experiences an obesity epidemic. As a child, my teachers repeatedly told students to be quiet, stop fidgeting and remain sedentary in the classroom so as to focus on our studies; but as Gallagher points out, "America's obesity epidemic offers stunning illustrations of what can happen when motivation and attention become disconnected from daily behavior in general and each other in particular" (Gallagher, 2009, p. 174). More interaction, team work, and

play time would enhance motivation, stimulating students to find interest in their studies. Studies also suggest that nature can relieve stress and have positive effects on physical and psychological health. Grinde and Patil (2009) share findings of Richard Louv who uses the term "nature-deficit" and suggests that "the increase in prevalences of conditions such as obesity, attention disorders, and depression is partly due to a decrease in the degree children are exposed to Nature" (p. 2338). Dr. Brown (2009) argues that play is beneficial in our lives, "actually making us more productive and happier in everything we do" (p. 7). Dr. Brown talks not just about children at play, he talks about everyone. Adults are grown children. We all need play time, motivation, and stimulation. Classrooms and workplaces need to accommodate play time, social activities and provide stimulating work environments. "[W]hile we readily accept that a healthy seed can't grow into a plant without right soil, light, and water, and that a feral dog wont behave like a pet, we resist recognizing the importance of environment in our own lives" (Gallagher, 1993, p. 16). For the older and employed, no longer in a classroom setting, Dr. Brown describes a popular problem, "We strive to always be productive, and if an activity doesn't teach us skill, make us money, or get on the boss's good side, then we feel we should not be doing it. Sometimes the sheer demands of daily living seem to rob us of the ability to play" (Brown, 2009, p. 7). As ergonomic research studies show, workplaces that demand a high level of sedentary work and deprive workers of healthy opportunities for interaction and play, harm employees and employers. Quality of life, blood flow, respiration, collaboration, injuries, and overall health can all be enhanced and improved when ergonomics are considered in workplace development, design and processes (Congleton, December 2, 2010, ErgoExpo presentation). Waikar, et al (1995) identified factors, such as task-related, workstation-related, ergonomic, and psychosocial factors, associated with health complaints of employees engaged in sedentary work. Such health complaints often lead to work lost to sick days, ergonomic assessments and medical appointments. Medical and insurance costs for employees and companies rise and workers' compensation costs increase. Similarly, Yerkes-Dodson Law (1908) states people perform better if they are stimulated or motivated (Oseland, 2009, p. 245). A Chicago high school, Naperville Central High School, experiencing the culture of fitness has embraced a daily graded physical education program. One group of

struggling students at this high school have been involved in an innovative program which schedules PE right before their most challenging classes. "In the six years since that program started, students who signed up for PE directly before English read on average a half year ahead of those who didn't, and students who took PE before math reported dramatic improvement in their standardized tests" (Iskander, 2011).

As research and literature report, emotional health, social health and physical health are important factors in being fulfilled and healthy human beings. Together, emotional health, social health and physical health constitute health on a larger scale, holistic health. Factors of holistic health, then, are biophilia, ergonomics, and exercise, which are believed to contribute to well-being and productivity in the workplace. Observing and recognizing employees' and employers' perceptions of holistic health and workplace design have implications for a healthier workforce and healthier working environments, productivity gains and happier personnel. Winifred Gallagher (2009) claims, "Staying focused is an excellent strategy for well-being," and "the skillful management of attention is the first step toward any behavioral change and covers most self-improvement approaches like a vast umbrella" (p. 10). Focusing on health in workplaces of the more affluent consumer capitalist economies of the more prosperous populations of the planet can be a proactive effort to enforce some basics of sustainable living by improving quality of life and working conditions, providing jobs, conserving natural resources, enhancing economic growth and managing risk.

Small Sedentary Workplaces

Donald A. Norman stated (2004) that "Until recently, emotion was an ill-explored part of human psychology. Some people thought it an evolutionary leftover from our animal origins" (p. 18). In a study by O'Toole & Lawler, more than 7,000 US workers were asked if they agreed with particular statements regarding concerns for their work. "Forty-four percent of workers in small organizations reported that they "often feel energized" at work, versus twenty-eight percent at large organizations. Likewise, a much higher percentage of workers said they are "willing to put forth more effort" in their work and "feel passionate" about their jobs than their counterparts at large firms". Concluding that workers at smaller organizations are more satisfied because they

belong to "supportive communities in which they know their bosses and coworkers and in which they are treated as individuals," the researchers found that dysfunctional stress can be reduced when workers are provided with more authority, tools, resources and education. A careful redesign of work tasks can provide a supportive work environment so as to positively affect productivity and retention (Clark, 2011).

Findings reported at the 2010 ErgoExpo in Las Vegas, NV, illustrated evidence for profit potential in wellness. Organizations monitor their employees' health and record numbers, health costs, workers compensation claims, furniture and equipment costs, benefits, retention, sick days, happiness and productivity as they enforce wellness in the workplace. Although old habits die hard, information spreads, beliefs change and minds open, allowing for a cultural shift in workplace practices and workplace design to accommodate the users.

Sedentary Work

Oseland (2009), in a journal article on impacts of psychological needs on office design notes that "Homo Sapiens evolved around 400,000 years ago in natural environments, but people have only worked in offices for around 100 years (p. 250). In this relatively short amount of time, humans have evolved and grown intellectually with innumerous advances in technology. Although technology has obviously enhanced the well-being of mankind, industrial and technological advancements have hindered man's relationship with nature. As many job positions demand sedentary work lifestyles, spending long hours working at desks and computers with little movement, *Homo Sapiens* have regressed into a slouching position over keyboards, mice, desks and computers. This evolution is portrayed in a design titled "Something, somewhere went terribly wrong." This image, by an unknown artist, depicts man at the beginning of evolution to the man of today who has regressed into a hunched position, in comparison to an ape on all fours. A walking ape becomes a walking armed man which transforms into a tall-standing man with tools; and the final transformation is a representation of man today, a sedentary working man sitting in a chair, hunched over a desk looking down at a computer (see Figure 3). In the 70's, E. F. Schumacher (1973) stated that "modern technology has deprived man of the kind of work that he enjoys most, creative, useful work with hands and brains, and given him plenty of work of a fragmented kind,

16

most of which he does not enjoy at all" (p. 151).
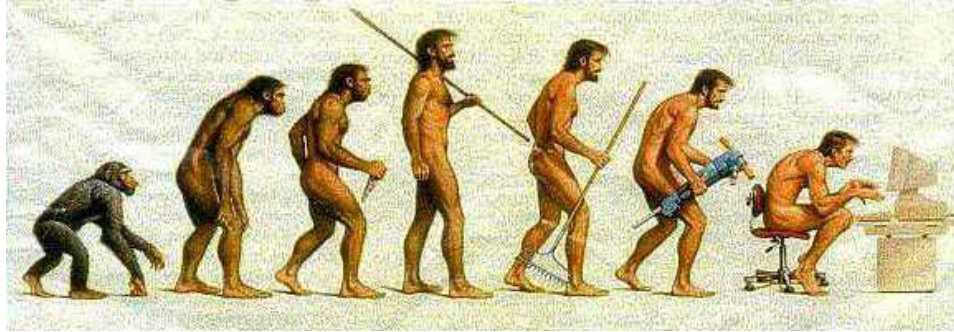
Figure 3. "Something, somewhere went terribly wrong" image by an unknown artist (Localoaf, 2011)

Although the Industrial Revolution made tedious labor a thing of the past, computers have caused ailments from long continuous hours of sitting in chairs and workstations. Results of Waikar and Bradshaw's (1995) study of exercise and exercise preferences in the workplace indicate that "physical stress in sedentary work may manifest itself relatively quickly, thus encompassing a large portion of the working population" (p. 22). Many jobs require sedentary positions and routine for work. Bank tellers, accountants, tax preparers, insurance providers, architects, telemarketers, graphic designers, draftsman, secretaries, other clerical jobs (and many others) demand sedentary positions in the workplace. Such positions can be harmful physically, socially, and emotionally. Waikar and Bradshaw (1995) confirmed with previous research study findings (Sauter et al., 1991; LeGrande, 1993) that workers of sedentary jobs suffer from back pain, eye fatigue, hand, wrist and arm discomfort, headaches, leg pain, neck pain and other discomforts (p.22). Sedentary work quite often demands private working spaces, separating one from interacting with others in collaborative efforts, activities and change of environment. "The experience of separateness arouses anxiety; it is, indeed, the source of all anxiety;" and separate means to be cut off and helpless, "unable to grasp the world—things and people—actively…" (Fromm, 1956, p. 7). Humans are social animals; we have an innate desire to socialize with other humans. This must not be forgotten or ignored in professional workplaces. In 1956, Erich Fromm wrote: "Society must be organized in such a way that man's social, loving nature is not separated from his social existence, but becomes one with it" (p. 111-112). Besides causing pain and

17

discomfort and depriving workers of social interaction, such sedentary work demands also deprive workers of natural sensory stimulation. Literature on environmental psychology addresses further problems related to sedentary work and examples of deficient and positive work environments.

With poor eating habits, no time for play and exercise, and sedentary work demands, weight management becomes a priority for many people. Considering recent work culture, consumer habits, and corporate industries such as fast-food chains lacking nutritionally balanced low-calorie meals, it is a no wonder obesity is an epidemic. *The Economics of Overweight and Obesity - Medical Care and Health-related Costs* discusses statistics on economic costs of obesity. Seventeen percent (8.8 billion dollars) of the total direct cost of heart disease, not including stroke, were related to overweight and obesity (Net Industries, 2011). RAND Corporation (2007) researchers concluded after a series of studies analyzing obesity trends, that:

- Obesity in the U.S. population has amplified increasingly over the past twenty years; and severe obesity is increasing the fastest.
- Obesity generates higher health care costs and contributes to disability at all ages.
- Medicare and Medicaid savings as a result of increasingly good health among the elderly could be swamped by the cost consequences of disability among the young.

Considering recent research results on obesity, workplaces would benefit economically by promoting more active choices, programs and opportunities for their staff. Reports of a Canadian research study (2010) in *Employers That Don't Interview to Curb Workers' Bad Health Habits Incur More Costs,* state that of a poll of approximately 4,000 Canadians in 2010, a majority of employees have three or more unhealthy behaviors, and a majority also feel their employer bears some responsibility when it comes to their health. Research indicates that not taking employee habits and health into consideration may be more expensive in the long run than taking the time to investigate employee behaviors and take on responsibilities for employee health. "Employees exhibiting several unhealthy behaviors are more likely to incur higher group benefit costs due to absenteeism, drug claims and disability." This research study found that "barriers to maintaining a healthy lifestyle include lack of willpower or motivation (61 percent) followed by lack of time (46 percent) and money (39 percent).

Holistic Health

Holistic health equally encompasses emotional health, social health and physical health. In Dr. Sternberg's explanations of human connections, she connects relationships with spirituality, emotions, and physical well-being: "Our sense that powerful forces beyond our bodies link us to others is so ingrained that we use phrases such as "ties that bind," "family ties," and "bonding," to describe those intangible connections. And the emotions they evoke are among the greatest forces that affect our hormonal, our nerve chemical, and our immune responses—and through these, our health and our resistance to disease" (Sternberg, 2001, p. 133). Essentially, emotions that are rooted in social relationships or mental capacities can affect the health of the physical body. The body cannot be improved or worsened without also affecting the mind, and vice versa.

Emotional health has been found to contribute to work success, relationships and overall health (Diener, King & Lyubomirsky, 2005). Happiness, an expression of healthy emotions, is factor contributing to productivity in the workplace according to research of Diener, King & Lyubomirsky. Researchers have often believed that mere financial success made people happy, but recent research that examined the connections between desirable personality characteristics, life successes and well-being in over 275,000 people revealed that "happy individuals are predisposed to seek out and undertake new goals in life and this reinforces positive emotions" (p. 803). Goleman states that "emotions are contagious" (2006, p. 13). If emotions are contagious, and happiness is a socially contagious emotion, emotional health and social health are connected.

Abraham Maslow's Hierarchy of Needs, a motivational theory of psychology that represents a model of human-centered motivation based on goals, suggests that people have five tiers of needs in order to grow into the ultimate person they are capable of being (Maslow, 1943). These five needs consist of physiological needs, safety needs, love needs, esteem needs and the need for self-actualization. The first four lower need to be satisfied before higher-order needs can influence behavior; hence the hierarchy of this model of needs. The lower levels needs include air, food, water, sleep, sex; then security of environment, employment, resources, health, property; then love, friendship, intimacy, family; then confidence, self-esteem, achievement, respect. The higher-order needs consist of morality, creativity and problem solving. Although there is a range of

19

interpretation about how much each of the lower order needs must be satisfied prior to the ability to develop the capacity of self-realization, human needs consist of emotional, social and physical needs. Based on Maslow's Hierarchy of Needs, one can say that workplaces catering to well-being of personnel take aspects of emotional, social health and physical health into consideration—essentially the body and mind, as they are quite naturally priorities of humankind.

Gallagher (1993) states that there is a disconnect between humans and our immediate environments. Our immediate environments—home environments, work environments and larger urban systems—affect us socially and physically, even biologically, as where biophilia is concerned (Dugdill, 2000). Whether or not these immediate environments provide space and activities for social and physical activities, our overall well-being is affected. Steelcase promotes holistic health with a balance of cognitive, social and physical well-being through its "movement toward wellness in the workplace" design guides. Printed in the Details booklet by Steelcase Inc. (2009) is a "Physical Checklist" as well as cognitive and social checklists that can also be found by visiting Steelcase's website.

"Cognitive Checklist":

1) "Work areas that provide sufficient lighting."

2) "Provide a variety of solutions for privacy and interaction."

3) "Address information processing and storage needs of diverse jobs."

4) "Work tools that allow you to organize your information to accommodate the way you work."

5) "Workstation that promote movement, keeping users energized."

"Social Checklist":

1) "Provide a variety of collaborative spaces."

2) "Offer collaborative solutions that work for longer periods of time, keeping workers refreshed."

3) "Train workers to use the ergonomic features of their work environment."

4) "Encourage health with employee wellness."

"Physical Checklist":

1) "Seating that allows dynamic movement and postural change."

2) Workstations that allow you to work while you stand."

3) Seating that keeps you oriented to your work."

4) Work tools that come to you and are easily adjustable."

5) "Seating that is easily adjustable and made to fit you, not the other way around."

Biophilia

Evolutionary psychology is a newer science that argues that "innate human behaviour is governed by adaptations of psychological processes which evolved to aid our survival and well-being" (Oseland, 2009, p. 250). As a result of human's innate predispositions for survival and well-being, people are social, needing a sense of community and belonging, human sense of direction is based on natural clues such as the sun and landmarks, and people want to explore what is around them, with clear views in all directions. "Only a hundred years ago, the overwhelming majority of Americans lived in the country, while today, most cluster in metropolitan areas" (Gallagher, 1993, p. 13). Classrooms teach us that humans, similar to other living species, have evolved over millions of years responding to earth and sun cycles. Such cycles produced predictable biochemical and behavior changes. "Environmentally minded scientists have begun to question the trade-offs we unwittingly make in order to live sealed up inside an artificially heated, cooled, and lighted world that is structured around economic rather than biologic concerns" (Gallagher, 1993, p. 13). Gallagher reminds us that the Industrial Revolution brought people indoors. "Turning away from the natural world, huge populations gravitated toward a very different one made up of homes and workplaces that were warm and illuminated regardless of season or time of the day—although even on a rainy morning, it is brighter outside than inside with the lights on" (Gallagher, 1993, p. 12). Evolutionary psychologists argue that "people feel refreshed sitting in a natural environment because nature provides a setting for "non-taxing involuntary attention" (Oseland, 2009, p. 250). As evolutionary psychologists argue for innate tendencies to be affiliated with other species and natural environments, biophilia is a key theme within evolutionary psychology. To some, "nature" means plants as in gardens, forests and parks, but weather and animals (humans included) are also directly connected. Although not may studies

on the topic of biophilia address human preferences for affiliations with animals, one study by Tesitel et al. (2001) found that of a community of approximately six-hundred families in Czech Republic, almost twenty-five percent claimed their pets to be family members. These pets consist of mainly dogs, budgies, fish, hamsters, turtles, guinea pigs, cats and snakes.

The term biophilia was first coined by Erich Fromm in *The Anatomy of Human Destructiveness* (1973). Fromm defined biophilia as "the passionate love of life and of all that is alive; it is the wish to further growth, whether in a person, a plant, an idea, or a social group" (p. 406). Biophilia became a popular term when Edward O. Wilson published *Biophilia: The Human Bond with Other Species,* in 1984. Wilson defined biophilia as "the innate tendency to focus on life and lifelike processes" (Wilson, 1984, *Prologue*). To Wilson, it seemed unquestionable that human beings have an innate sensitivity to and need for other living things, because we have coexisted in the closest relationship with the natural world for so many millennia. According to Wilson, it is ultimately human nature and a genetic predisposition, hereditary desire to have an emotional affiliation with human beings and other living organisms (Kellert, et al., 1993, p. 31). Because elements of biophilia (or lack of) constitute peoples' physical and social environments, elements of biophilia affect peoples' social health and emotional health. For example, a lack of plants or animals may weaken one's emotional, or similarly, cognitive health. Grinde and Patil (2009) report that even though some people do not express any interest in plants and nature, the absence of nature can actually have a negative effect on them (p. 2339). Although some people may suffer from biophobia, a fear of nature and other living species, studies report that the absence of greenery can be a stress factor, whether the absence of greenery is noticed consciously or without thinking; "the presence of plants can impact on the human mind" (Grinde & Patil, 2009, p. 2338).

Besides the necessary conversion of carbon dioxide into oxygen, biological plants offer growth, life, change, value, aesthetic qualities, emotional benefit, and health and healing properties to humans and other living organisms. Wilson's *Biophilia Hypothesis* associates our fondness of and desires for plants with our innate desire and genetic predisposition towards plants for means of survival, food and shelter. "For the indefinite future more children and adults will continue, as

they do now, to visit zoos than attend all major professional sports combined (at least this is so in the United States and Canada), the wealthy will continue to seek dwellings on prominences above water amidst parkland, and urban dwellers will go on dreaming of snakes for reasons they cannot explain" (Kellert, et al., 1993, p. 32).

In the second century A.D., Aretaeus prescribed for people suffering from lethargy to lay in the sunlight because their disease was gloom (Gallagher, 1993, p. 12). The four humors, or body fluids, according to Aretaeus: yellow bile, black bile, phlegm, and blood, were said to determine everything from a person's constitution to his character. These four body fluids were said to correspond to the four elements of fire, earth, water, and air, and were also related to summer, fall, winter, and spring; therefore, an individual's physiological and behavioral changes could be viewed in the context of the sun (Gallagher, 1993, p. 12). Gallagher notes the startling disconnect in current science studies and theories of the sun. "…in the West, exposure to the sun's bright light has become erratic in duration and timing for the first time in history, and they [environmentally minded scientists] suspect that the fact that most of us are no longer wakened by the dawn, drawn outdoors for much of the day by our way of life, and lulled to sleep by darkness helps explain why up to a third of us suffer from sleep or mood problems, or both" (Gallagher, 1993, p. 14). Hundreds of years ago the idea that light affects mental and physical health was a widely accepted principle. This more recent observation made by environmentally minded scientists suggests, as Gallagher puts it, that "science forgot about it", a widely accepted belief many years ago.

Despite intuitive thoughts on the benefits of affiliations with nature, an increasing number of studies report findings that nature provides psychological and physical health benefits. Grinde and Patil (2009) share reports of health benefits from association with nature experiences, true wilderness experiences, neighborhood parks, gardens, and natural features around residences:

- nature reduces stress;
- improves attention, by having a positive effect on mental restoration and by coping with attention deficits;
- and increases longevity (p. 2335).

William McDonough and Michael Braungart designed an "eco-effective" factory for Herman Miller that brought together visions of "a life-centered community and environment" (McDonough & Braungart, 2002, p. 75). This factory noticed "dramatic productivity gains," which analyses confirmed were a result of one factor, biophilia. Retention rates were noted as "impressive" and employees who left the factory for higher paid jobs returned stating they could not work "in the dark" (p. 75-76). Their goal of the design was to "give workers the feeling that they'd spent the day outdoors, unlike workers in the conventional factory of the Industrial Revolution, who might not see daylight until the weekend" (p. 75). McDonough and Braungart succeeded in designing an ideal work environment for industry workers: "We designed the factory around a tree-lined interior conceived as a brightly day lit street that ran the entire length of the building. There are rooftop skylights everywhere the workers are stationed, and the manufacturing space offers views of both the internal street and the outdoors, so that even as they work indoors, employees get to participate in the cycles of the day and the seasons" (p. 75).

A study (Tesitel, et al., 1993) of the absence of natural components in an urban environment found that the absence of parks and landscaped community areas limited the 'pleasant experience' of people living in the area. "The absence of plants may suggest an "unnatural", and thus potentially unsafe, environment;" as plants may affect the human mind through unconscious mechanisms, even when plants are not the object of focus (Grinde & Patil, 2009, p. 2335). Velarde et al. assert that a lack of city green spaces or unmanaged green spaces can cause increased anxiety that increases the incidence of crime (p. 2339). Expressing a growing problem in the United States in the 70's, Scuhmacher noted that, "Modern man does not experience himself as a part of nature but as an outside force destined to dominate and conquer it" (Schumacher, 1973, p. 14). Some propose that love, an aspect of biophilia, will cure this disconnect between man and nature as well as cure mankind of other worldwide problems, even health problems in the workplace. "The human need for nature is linked not just to the material exploitation of the environment but also to the influence of the natural world on our emotional, cognitive, aesthetic, and even spiritual development" (Nelson, 1993, p. 42).

Ergonomics

The International Ergonomics Association states that "ergonomics promotes a holistic approach in which considerations of physical, cognitive, social, organizational, environmental and other relevant factors are taken into account" (IEA, 2010, para. 4). Ergonomics is a broad discipline including occupation health. It is now applied to office workstations after first being applied to cockpit design during World War II, and then factory production facilities (Cranz, 1998, p. 97). "The term "ergonomics" comes from the Greek ergon, meaning "work," and –omics, meaning "to manage." Thus, ergonomics is the study of the relationship between the person and the immediate environment (Cranz, 1998, p. 97). The International Ergonomics Association Council defined ergonomics in August 2000. Their official definition of ergonomics is: "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" (IEA, para. 1). Dr. Jerome. J. Congleton defines ergonomics as: "The study of the work to prevent and control injury and illness while improving wellness, productivity, quality, marketing, customer service, delivery and reducing turnover and costs" (ErgoExpo, 2010.)

Ergonomics has implications for all physical aspects of the workplace: furniture, lighting, noise, temperature, movement, tools, equipment, machinery, devices, and of course people; people and their physical, psychological and social health. A common practice within ergonomics is taking anthropometric design into consideration, such as the idea of accommodating the extreme dimensions and activities of a population; because, when equipment is designed for the dimensions of an average person, most users are limited. By designing for the tallest and the shortest percentiles of a user population; it is easier for most users to adjust furniture and equipment by raising or lowering for others. If a door knob were placed at average height, a child or a midget would be excluded from its use. General rules are to design leg clearance for tall people and reach distances for smaller people, or better yet, accommodating users with adjustable or custom furniture and equipment. Adjustable tables allow vertical adjustment of workstations to accommodate a larger range of possible personnel heights. In addition to height, it is also

important to consider the weight of users. It is recommended that armrests be provided for obese people as well as for elderly. Taller chairs are easier to exit for older people.

Ergonomists actively analyze human-system interactions and the design of the system in order to optimize human well-being and overall system performance (IEA, 2011). This review of literature on the topic of ergonomics focuses on recommended set ups for ergonomic work stations. Incorporating wellness into workplace design involves ergonomic recommendations as those by Dr. J. Congelton (ErgoExpo, 2010):

- adjustable tables
- vertically adjustable workstations that allow the work surface to accommodate a range of possible worker heights
- standing more or moving and walking
- use sit-stand workstations
- use decent ergonomic chairs
- change postures even while sitting (from slightly reclined to sit-stand)
- arrange the keyboard, numeric keypad and/or calculator to produce a neutral wrist position
- use an alternative split keyboard such as the KeyOvation, Goldtouch keyboard which allows less outward and upward positioning of the wrist (Generally, keyboard slope is a matter of personal preference, however; it is recommended that keyboard slopes be minimized and limited to the range of a plus or minus fifteen degree angle. Recent research supports slopes that produce a flat or downward bend in the wrists, rather than an upward bend.)
- Use a headset and/or a speaker phone.
- Lower the workstation and use the arm rests/wrist rest or an adjustable keyboard tray to support the arms.
- Use the chair and backrest as support for the torso, not the chair's armrests.

- Tilt the seat and backrest forward to keep the head and trunk relationship more vertical; or get a headrest chair.
- If not using adjustable armrests, allow the arms to hang naturally at the side and use a wrist-rest or palm-rest to at least provide support when the hands are not moving to type.
- Use adjustable armrests on the chair and wrist-rest or palm-rest on the work surface to support the weight of hands and arms.
- Reposition documents, keyboard and screen to keep the head looking forward, keeping the eyes focused slightly down.
- Position work that is viewed in front of the operator (either on a document holder or on a computer monitor) at or slightly below eye level (Neutral eye position is slightly down from view to horizon: 20° to 25°.).
- Reduce unnatural motions and unnatural postures during work related activities.

Dr. J. Congleton is Co-Director of the Ergonomics Center, Professor of Ergonomics and Safety Engineering, Strength & Conditioning Performance Coach at Texas A & M University. He shared statistics from studies addressing ergonomics and workplace health at the Ergonomics Conference and Exposition of 2010 in Las Vegas, NV. Factors that have implications on the design and layout of office furniture are the increase of task work without interruption and rising obesity (Congleton, 2011).

With concerns for the growing obesity epidemic in the US, Dr. Congleton reports that thirty-five percent of adults in the US are overweight and twenty-six percent are obese. Obesity is clinically defined as thirty pounds overweight (Levine, 2009, p. 43). Considering the health risks that come with obesity and the costs of such diseases and illnesses, introducing more movement into the workplace is a preventative measure, similar to traditional Chinese healing practices that use proactive approaches working to prevent illness. Ergonomists recommend that personnel sit when they are tired and stand for twenty minutes, three to six times per day. Standing delivers health benefits. Sit-stand workstations and workstations like Steelcase's Walkstation that provide opportunities and equipment for exercise (Steelcase OfficeScapes) offer many benefits to personnel working long hours at a typical sedentary work station. Dr. Congleton notes that,

depending on body shape and metabolism, personnel can burn 280 extra calories on an average workday by standing for two hours throughout the workday; equivalent to approximately twenty pounds of weight lost in one year. To do this, he recommends:

- raising desk heights from thirty to forty inches,

- raising the chair to stool height so as to allow users to easily and freely stand up to work periodically, and

- using a keyboard tray and monitor arm, essentials if an electric height adjustable desk is not available.

By working at sit-stand-walk workstations, personnel can burn more calories, possibly lose weight, relieve pressure on spinal discs and ease physical ailments.

Why should people stand at work? Dr. J. Congleton supports standing with justified reasons: standing allows for a wider range of motion, uses larger forces, promotes blood flow and postural changes, better respiration and reaction alertness, burns more calories, and lowers pressure in low back discs. When we sit, pressure on some spinal discs increases thirty percent compared to when we are standing (Cranz, 1998, p. 97). Dr. James A. Levine, an obesity specialist at the Mayo Clinic, notes that, compared to sitting, one can burn three times as many calories an hour standing; (Levine, 2009, p. 43). "If sitting is the problem, standing is the answer" (p. 43). Standing is not necessarily better than sitting; studies show that sitting and standing should be alternated, allowing for movement and multiple positions. Dr. Congleton recommends personnel to sit when tired and stand when they can for twenty minutes, three to six times per day. If options for sit-stand or standing workstations are not provided, other ergonomic solutions are also possible. A variety of sizes of chairs to meet the varying needs of personnel can be provided. The best and most ideal situation would allow individuals to choose the most appropriate chair or chairs for themselves. If seated for longer than two hours per day, Dr. Congleton's considerations for office chairs entail:

- adjustable seat pan height to accommodate for a range of statures (5th percentile female to 95th percentile male),

- adjustable seat pan depth to accommodate a range of statures,

- lower back (lumbar) support which assists in restoring some degree of lumbar curvature,

- upper back support which helps reduce energy expenditure required in maintaining proper posture when seated,

- adjustable seat pan width which allows for comfortable seating for a range of hip breadths and physical body weights,

- arm support/armrests (allows for easier entry and egress from chair and allows for off-loading of arm weight from the shoulder while working),

- casters (to increase the mobility of the chair allowing easier access to objects not in immediate reach and allow for greater access to workstations without having to lift and hop),

- five-point base (chairs with fewer than five legs on their base are less stable and prone to tipping),

- appropriate fabric upholstery (should have some degree of elasticity that does not place restrictions on cushioning qualities of foam and should be compatible with type of clothing worn by workers).

Regular breaks are recommended by ergonomists. As a part of ergonomic assessments, ergonomists note whether office personnel take breaks, how often breaks are taken, and whether break-time reminder software is used or not. Specifically, Bowdoin College's Office of Environmental Safety "Workstation Ergonomic Assessment Checklist" notes that breaks should be take at least 10 minutes per hour.

Why should workers sit? Sitting causes less fatigue, comforts the knee, hip back, ankle, offers stability, assists in data entry, allows for use of foot controls, and accommodates meetings. Sit-stand workstations with adjustable keyboard platforms and monitors are recommended by Dr. Congleton for workplaces where personnel use computers for more than four hours per day. GeekDesk® recommends its product for the options of working sitting and standing at the same desk; it is electrically operated. They claim this electric desk adjusts working height from sitting to standing (or anywhere in between) at the touch of a button, increases productivity, supports a variety of positions, reduces back & neck pain, helps people feel better and focused stay more easily (GeekDesk, 2011). The sit-stand workstations are recommended by Dr. Congelton for

personnel who are tied to their work areas by phone or other equipment within reach, for example, customer service, data entry, and help desk personnel. Monitor placement for sit-stand workstations should be placed according to the user. The top of the screen should be approximately eye level with the user and about thirty-two inches from the user; the appropriate location results in an approximate angle of twenty to twenty-five degrees down from the user's eye height to the monitor screen (Dr. J. Congelton, 2010).

The Chair

Galen Cranz, in *The Chair: Rethinking Culture, Body, and Design,* boldly described the history, functions, and possible improvements of chair design while addressing ergonomics and mind-body relationships. She suggested "inventing an entirely new system [of seating] to promote movement at work and at schools" as she argues against the chair (1998, p. 19). Chairs are popular decorative elements today, prized for appearance over function, resulting in concerns of the body, especially where sedentary work is required. Dr. Jenny Pynt and Joy Higgs published a book on the design and history of chairs and seating, *A History of Seating, 3000 Bc to 2000 Ad: Function Versus Aesthetics*. They argue that functional seating needs to assist users for performance of seated asks, enhancing rather than detracting from user posture and health. Aesthetic features should be taken into consideration as well, aesthetics that do not limit tasks or health. In the home, office, and schools, chairs need to be reformed for healthier postures. Our bodies were not meant to sit in positions for long periods of time; they need movement. According to Cranz, "from a somatic point of view, chairs pose many different problems" (p. 135). The seated position we are accustomed, is a health hazard, causing back pains and many other health problems. Dr. Jenny Pynt published a book in 1998, titled *The Seat of Your Pain May Be Your Chair.* From experience, Cranz states that: "Improving the basic configuration of the conventional chair involves aligning and supporting the torso properly" (p. 152). Cranz explores culture, ergonomics, and mind-body relationships for the reform of the chair. Critical for recognition by designers, is Cranz's statement that: "Probably the single most important principle of body-conscious design is to use design to keep posture varied and the body moving" (p. 185).

Cranz explores why stools are uncomfortable for a majority of us. She believes that "we can't

sit upright simply because we have grown accustomed to being supported by chair backs" (p. 95). She explains this "vicious cycle" with her hypothesis: "we lean back because our muscles are weak, and leaning back weakens the muscles even further, so that we 'need' support even more" (p. 96). After collecting evidence from multiple countries and cultures, Cranz found that sitting is associated with back problems, varicose veins, stress, fatigue, diaphragm, circulation, digestion, elimination, and general body movement (p. 97). According to Cranz, scientific literature on chair design is concerned with ergonomics; measures of the relationship between work-related human activity and the immediate environment, "which includes chairs" (p. 93). Linton et al. (1994) found that furniture design is one aspect of a multidimensional problem. Specifically, pupils' attitude and behavior problems were found to be associated with poor ergonomic school furniture. During a six month controlled experiment of testing and ergonomic assessments, the experimental group of fourth graders who used ergonomically designed school furniture experienced a reduction in musculoskeletal symptoms and found their furniture to be significantly more comfortable than the traditional furniture used by the controlled group. Sitting behaviors differed only slightly in this investigation, although proper instructions on how to use the ergonomic furniture correctly were provided. Although Cranz stated that ergonomic recommendations never completely eliminate the damage caused by chair sitting, following such recommendations would minimize health risks (p. 101-102).

Stating that no body should remain in one single posture for long periods of time, Cranz recommends healthier chairs for human posture. Among her recommendations are: rocking chairs, inflatable therapy and exercise balls, Le Corbusier's lounge chair (see Figure 4), Opsvik's Norwegian Balans chair, also called the kneeling chair (see Figure 6 and 7), Opsvik's Gravity lounge chair (see Figure 5) and Mandal's tilting stool.

Rocking chairs often have high backs, offering appropriate support to the shoulder, neck, and head (p. 184). Because rocking chairs "move the ankle, knees, and hip sockets directly, and the head-neck joint and the entire spine only slightly less directly," they are recommended by Cranz (p. 184). Because inflatable balls found in physical therapy and fitness exercises are unstable surfaces, they require users to actively use the legs and torso and continuously use different

31

muscles, which can help triumph circulation and muscle fatigue problems that are associated with conventional sedentary work positions. Dr. Mandal's chair supports perching, a position that is between sitting and standing. Rather than resting on the knees as Opsvik's Balans chair requires, this perch stance creates a tripod between the left and right feet and the sit bones. For this tripod stance, a significantly higher (than conventional chairs) forward-tilt seat is required. Le Corbusier's lounge chair (see Figure 4) is recommended by back surgeons for people suffering from back problems, because the chaise supports the entire back all the way up, including the shoulders, neck and head (Cranz, 1998, p. 183). The cylindrical neck, however, may require an adjustment for many users, as it may be too thick, claims Cranz.

Figure 4. Le Corbusier's lounge chair (DWR, 2011)

Peter Opsvik's Gravity chair is another recommended chair by Cranz because, as a lounge chair, it provides back, shoulder, neck and head support (see Figure 5). Different from Corbusier's lounge, the Gravity chair involves movement, allowing different positions that are acquired through shifting body weight in the chair. From a lounge chair, the Gravity converts to a conventional chair and to a kneeling chair. Space is also provided for the shoulder girdle to rotate independently of the head and spine. The Gravity™ balans® chair is available at Varier®.

Figure 5. Peter Opsvik's Gravity chair (Varier, 2011)

Figure 6. Varier® Variable ™ Balans ®, designed by Peter Opsvik (Opsvik)

Cranz praises the Norwegian Balans chair, also known as the kneeling chair, designed by Svein Gusrud and Peter Opsvik, because it improves breathing and keeps the spine in its natural curvature by forcing the thighs to drop in relation to the spine, creating an oblique angle so that "the work of sitting upright is distributed between the front and back of the spine and along its length most evenly so that sitting upright is easy, one doesn't tire, and therefore one doesn't need or want back support" (1998, p. 116). An inspiration of Mandal's forward-tilt seats, this chair that neither looks like a chair nor a stool, was engineered in the late 1970's and exported to the United States in 1981 (Cranz, 1998, p. 170). This chair improves balance, circulation and oxygen levels because it builds back and abdominal muscles and rebuilds torso strength; Varier® calls this

"active sitting" (Varier, 2011). A recent design of Opsvik's Balans chair offers back support; it is called the Variable ™ Balans ®, available at Varier® (see Figure 7).

Figure 7. Varier® Variable ™ Balans ® with optional back support (Varier, 2011)

Cranz explains that "new ergonomists evidently believe that people should change their work and living environments, radically if necessary, to put their physical comfort first instead of meeting traditional culture expectations" (1998, p. 118). Ideally, the chair will be redesigned to accommodate different body sizes and types, functions and movement. As Cranz mentions: "designing for movement takes us beyond a single object into the realm of interior design and planning," perhaps the best way to implement healthy functioning designs into the affluent populations that are accustomed to the chair is to change the interior design of homes, offices, and schools, so that people are allowed to use different spaces for different seating positions and movement (p. 184). After all, "…One of the most important aspects of a designer's role is to help change social perception" (p. 185).

Body and Mind

Encompassing the field of somatics are body-centered approaches that help people reconnect with the inner self, transforming through movement practices that promote psycho-physical awareness and well-being (Hanna, 1988). In 1976, Thomas Hanna used "somatics" as a term to describe various approaches to body-mind integration, a therapeutic method for reawakening the

mind's control of movement, flexibility, and health which he, the Director of the Novato Institute for Somatic Research and Training, developed. Hanna claimed that somatics "provides us with a way to live under the stressful demands of an urban-industrial environment and still remain healthy—physically and mentally" (p. xiv). A perspective that body and mind are connected, one not affected without affecting the other, is encapsulated in the term "somatics," an approach that requires working with the entire body as both the mind and the body are part of the living process. Somatics focuses on "the relationships between body and intellectual thought, cultural belief, individual feeling and will," and 'involves the whole human being, focusing in a practical way on the interactions of posture, movement, emotion, self-concept, and cultural values'" (Cranz, 1998, p. 120). Cranz explores the idea that many parts of our bodies and minds intricately work together and offers examples of how a holistic approach is needed to feel the whole body and use it well (p. 120-121). The principles of somatics are based on anatomy, the human body, psycho-physical processes. Essentially, we think to act and then we act. As Cranz explains, "people perceive and are curious, then their bodies follow" (p. 126). An important point that Cranz makes related to chair design and somatics is: "Any chair design that puts people in a posture that distorts the head-neck joint upsets the equilibrium of the entire body" (p. 132). A somatic thinker, F. M. Alexander, found all chairs to be problematic (p. 147).

Hanna (1988) discussed "The Myth of Aging.", questioning why degeneration and joint stiffness occurs with human maturity. Many people would be pleased to learn Hanna's achievements in counteracting the aging process. Hanna explains somatic exercises that have effectively led to major discoveries reprogramming the sensory-motor system. "The bodily decrepitude presumed under the myth of aging is both avoidable and reversible" (p. xii). Most of these exercises consist of slow movements that can be done on the floor. Hanna explained that as we age, muscular contractions become so deeply involuntary and unconscious that eventually we no longer remember how to move about freely, resulting in stiffness, soreness, and a restricted range of movement. Because this occurs in our central nervous system, we are unaware of such an occurrence. He described it as a "habituated state of forgetfulness" called sensory-motor amnesia (SMA); memory loss of how muscle-groups feel and how to control them. SMA is not age-

dependent. It occurs at any time beginning with childhood. Causes of SMA include disturbed situations, fearful environments such as war, and chronic muscular contractions as a result of traumatic accidents or serious surgery. Symptoms of SMA include: sunken chests, permanently raised shoulders, hyper-curved necks, scoliotic tilting of the trunk, slight limp and chronic un-diagnosable pain. Hanna described that: "Sensory-motor amnesia can be avoided, and it can be reversed" if one does two things: unlearns what has been learned and remembers what has been forgotten (p. xiii).

Exercise

"Modern man does not experience himself as a part of nature but as an outside force destined to dominate and conquer it" (Schumacher, 1973, p. 14).

Although most overweight health problems result from poor nutrition and diet than lack of exercise, exercise has been known to be beneficial in maintaining health. Ideally, workplaces would incorporate more play, exercise and movement. "By actively choosing endeavors that demand your total focus and skillfully using attention to make even inevitable rote chores more engaging, you can blur the distinction between work and play—a hallmark of the focused life" (Gallagher, 2009, p. 99). Aside from any other health issues, a lack of physical activity, known as "physical inactivity", is a risk factor for chronic diseases entirely on its own. Overall, physical inactivity is estimated to cause 1.9 million deaths globally (WHO, 2011). On the other hand, the World Health Organization states that significant health benefits are related to regular physical activity such as walking and sports activities. Thirty minutes of moderate physical activity per day is recommended by the World Health Organization. Regular physical activity can reduce the risk of cardiovascular disease, diabetes and osteoporosis, help control weight, and promote psychological well-being (WHO).

Endocrinologist, Dr. James A. Levine partnered with Steelcase to manufacture a workstation called the Walkstation that combines an adjustable sitting and standing height surface with a treadmill, operating at two miles per hour at the most (see Figure 8). Just as Rachel Carson's Silent Spring shook common thought and ignorance and took at least a decade to rattle change in agricultural treatment methods and environmental policies, implementation of the Walkstation into

everyday workspaces that are accustomed to sedentary work may take decades, especially in today's slow economic recovery. Costs and receptiveness to new ideas are factors slowing such implementations of exercise and movement into workplaces.

Figure 8. Steelcase Walkstation by Details (Steelcase)

Despite today's explosion of gyms and fitness clubs to fight obesity, Dr. Levine states that "the calories we burn behind their mirrored walls pale in comparison to those we could and should be burning in normal life" (Levine & Yeager, 2009, p. 43). Dr. Levine introduces everyday innovative practices for exercise at work in, *Move a Little, Lose A Lot*. Even moving around a little bit more on a daily basis can help maintain healthy body weight and burn calories. In one of Levine's scientific studies (an obesity paper published in *Science)* that quantified body postures with "NEAT underwear" lean and healthy volunteers, not "gym goers", "simply lived their life with greater movement, just the way nature intended" (p. 43). Technological advances have made some things are more convenient than they used to be, such as driving to and from places that are less than a mile away instead of walking. Small activities like watering plants, walking stairs,

walking to the printer rather than printing at the desk, and walking the long route are daily activities that require use of more energy by simply living. Interior plants support healthy efforts towards eight loss and weight management. Besides dusting, artificial plants may provide a convenient green representation of nature because they do not require the maintenance of planting, watering, placement according to sunlight, or pruning, but the extra body movements required to retrieve a water pitcher, filling up the water pitcher and watering the plant burn calories. Having living plants to care for provide opportunities to burn more calories. Dr. Levine would say watering plants is an opportunity to boost one's "NEAT", or calorie burning metabolism, also known as "nonexercise activity thermogenesis" (Levine & Yeager, 2009, p. 6). With his simply put NEAT theories on how to lose weight by moving little, Dr. Levine recalls human predispositions: "We have evolved to hunt and gather, sow and reap, and to spend the day burning thousands of calories through constant motion, not to run like mad on a treadmill for 20 to 30 minutes, burning maybe 200 calories, and then sit nearly motionless for the other 15 ½ hours of our day burning next to nil. That's why barely a quarter of the US population regularly "exercises," and why half of all people who embark on an exercise plan abandon it within six weeks. We're simply not engineered to live like that" (p. 5).

Standing rather than sitting or in addition to sitting while working, is a way to address the issue Dr. Levine brings up, therefore he designed the Walkstation treadmill (http://store.steelcase.com/products/walkstation/). Simply having a dog, or children, gives people more opportunities to walk, run, take the long way, play, bend, reach, stretch, skip, and spend more time outdoors. These simple activities support one's health; specifically through the factors of biophilia, ergonomics and exercise with access to and affiliations with nature, space, body-conscious activities and equipment.

Lack of exercise, smoking and poor diet pose major risk factors for diseases such as cancer, heart disease and diabetes. Due to higher health costs and sick days associated with people who are overweight and therefore not as healthy as physically fit and healthy people, workplaces are more likely to hire and retain physically fit and healthy employees; their health costs are typically lower and they require fewer sick days from work. It would therefore be beneficial for personnel if

workplaces provided space, time, opportunities, equipment and incentives for physical fitness actually within workplaces. "Since we spend the majority of our waking hours at work, our loss of NEAT ["nonexercise activity thermogenesis" or the energy one burns simply living life] at the workplace has had the most profound effect on our energy expenditure," possibly also limiting motivation and productivity levels (Levine, 2009, p. 16). Simple desk exercises such as those listed in Dr. Jenny Pynt's book *Desk Exercises* published in 1996, illustrates examples of how workers can self-treat their pain, improve posture and prevent chronic health problems in the office.

Waikar & Bradshaw (1995), refer to Austin's findings (1984) noting that "physical exercise has the potential to reduce work-related musculoskeletal stress" (Waikar & Bradshaw, 1995, p. 16). Waikar and Bradshaw studied businesses that provided formal exercise programs (or not), the willingness of personnel to participate in formal exercise programs, and employees' preferences for features of an exercise program. They concluded that ninety-seven percent of participants indicated that their employer did not have a formal exercise program (p. 23). Of that ninety-seven percent, sixty-nine percent responded that they would be willing to participate in a formal exercise program if one were offered by their company (p. 24). Dr. Levine notes, however, that a recent poll of more than one thousand mend an women found that "only 29 percent of American's current favorite pastimes involve any physical activity, down more than a third from ten years ago" (Levine, 2009, p. 17). Clearly, the way people actually behave is not always consistent with how they report their behavior. "Past favorites such as swimming, walking, and gardening have slipped from favor. Fishing and bowling are becoming quaint activities from bygone days," reports Dr. Levine (p. 17).

Steelcase's *360 article* on the topic of workplace lunch breaks addresses the concern that changing work environments, increased performance pressure and the hopes of leaving work early contribute to "killing lunchtime" (Steelcase, July 2006). Steelcase found that forty-nine percent of US workers who participated in the Workplace Survey Index spent their lunch hour working with colleagues, working during lunch and even eating at their desks. Other popular lunchtime activities include Internet shopping, reading, making phone calls, running errands, exercising and

even dating. Steelcase found in 2006 that the US lunch hour dropped to about half an hour and women are more likely to take shorter lunches than men.

Environmental Psychology

Because emotions such as happiness affect motivation levels, productivity and success, living in environments that create and sustain happiness for individuals can support work performance. It is valuable to consider location, macro and micro environments when relocating, choosing a school, a workplace, building, and designing. "Past research has identified many factors, such as demographic, task-related, workstation-related, ergonomic, and psychosocial factors, associated with health complains of employees engaged in sedentary work" (Waikar & Bradshaw, 1995, p. 18). The physical environment surrounding people affects their performance and health. Gallagher states: "Now modern science is confirming that our actions, thoughts, and feelings are indeed shaped not just by our genes and neurochemistry, history and relationships, but also by our surroundings" (Gallagher, 1993, p. 12). Just like the simplest of microorganisms, humans depend on their environmental interactions for survival (p. 15). Concerned for the disconnect between humans and our immediate environments, Gallagher states that "While we readily accept that a healthy seed can't grow into a plant without the right soil, light, and water, and that a feral dog wont behave like a pet, we resist recognizing the importance of environment in our own lives" (p. 16). Boyden (1971) distinguished needs for survival from needs for well-being. Well-being needs consist of physiological, psychological and social needs which can be addressed in interior design: meaningful change and sensory variability; opportunity to engage in a full range of species typical behaviors (creativity, self-expression, cooperation, exploration); opportunity to engage in spontaneous social encounters; an interesting visual environment; noise levels not much above or below that in nature; freedom to move between one social phase and another (from solitary work to group interaction); and opportunity for regular exercise (Clements-Croome, 2006).

Gallagher and Sternberg propose that people live in environments that support their well-being, whether a city location, beach or farm location is healthier depends on the person, a person's experiences, emotions, mind. "Hofer points to the migrations of the tiny typhoid bacillus: in order to live, it must swim to a place rich in the nutrient it wants, stop, and remain there, finding

its way by the reactions of receptors on its cell membrane to chemicals that send it into different states" (p. 15). Just in 1984, the first study to test the idea that physical space might contribute to healing was published in *Science* magazine (Sternberg, 2009, p. 1-2). Healing spaces, rooted in environmental psychology, now have a scientific basis. "Our decisions about where to live or work can have significant if often unsuspected impact on our well-being, whether through subtle means, such as lighting and plants, or more directly, through agents such as allergens or pollutants" (Gallagher, 1993, p. 19)

Health and Healing Environments

Earlier schools of thought believed external environments to be determinants of mental health, rather than simply individuals' internal processes, which most of today's psychological health emphasizes (Gallagher, 1993, p. 15). In classical times, temples to the Greek god of healing (Asclepius) "were built far from towns, high up on hilltops overlooking the sea" (Sternberg, 2009, p. 3). For years, hospital guests have given flowers and plants to friends and family suffering with health issues in an attempt to promote health and healing. The vibrant colors and beauty of flowers and plants surely rattle our human instincts. "Evolutionary biologists believe that in many creatures beauty is a reliable indicator of health, and therefore a perfectly sensible way to choose one mate over another" (Pollan, 2002, p. 74). Beauty is of instinct, naturally attractive to humans because it symbolizes health. Wilson (1984) states: "Mathematics and beauty are devices by which human beings get through life with the limited intellectual capacity inherited by the species. Like a discerning palate and sexual appetite, these esthetic contrivances give pleasure. Put in more mechanistic terms, they play upon the circuitry of the brain's limbic system in a way that ultimately promotes survival and reproduction" (p. 61). An annual meeting of the American Psychological Association discussed a study analyzing the ways in which lively and dull interiors affect mood and performance. "When the subjects' responded to a stimulating, plant-filled, homey setting and a grim, institutional one were contrasted, the only reaction they all shared was a decline in vigorous activity and increased feelings of fatigue in the austere environment" (Gallagher, 1993, p. 17).

"More than two thousand years ago, Hippocrates' observation that our well-being is affected

by our settings was established as a cornerstone of Western medicine" (Gallagher, 1993, p. 12).

Health and healing environments, such as hospitals, medical clinics, and doctors' offices,

incorporate artificial plants and representations of nature. For example, NatureMaker's Steel Art

Trees support healing processes by softening environments that may potentially appear bleak and

uninviting (NatureMaker). Views, color, temperature, light, plants, smells and other factors have

been documented as elements that affect people psychologically, influencing positive or negative

emotions, levels of motivation and hunger. These elements are also considered in human factors.

Oseland argues that poor working conditions can lead to dissatisfaction and therefore reduced

performance and interprets Maslow's Hierarchy of Needs into: "if we do not provide comfortable

environments that fulfill base human needs then, regardless of rewards, the building occupants are

unlikely to be at their most productive" (1995, p. 246).

As with Planetree's patient-centered and evidence based approaches to healthcare design,

healthcare environments today use patient-centered approaches while incorporating design

features to foster well-being and healing (Planetree, 2009). Dr. Sternberg (2009) notes that

"implicit in an understanding of the mind-body connection is an assumption that physical places

that set the mind at ease can contribute to well-being, and those that trouble the emotions might

foster illness" (p. 10). Oseland (2009) states that "design implications for evolutionary psychology

are self-explanatory, but nevertheless many offices fail to meet these basic psychological needs:

- provide a variety of spaces that allow people to gather, preferably with food and drink ("watering holes") made available;

- offer a stimulating and interesting environment and allow us to move around and explore rather than stay working in one place;

- create places which offer quieter environments away from colleagues to concentrate or just contemplate;

- design facades which offer views out and good daylight ingress that will meet biophilia needs as will good landscaping externally and planting internally;

- ideally, provide natural ventilation and the control of internal temperatures, or failing that good fresh air ventilation and the option to work in locations of a

different temperature;

- plan desks to offer views across the office and to the outside without the occupier feeling at risk of being overlooked from passersby (if located with their back to a main circulation route); and

- to satisfy egalitarian principles, ensure the workspaces on offer are made available to all (p. 251).

With innovative efforts to create healthy workplace design, Steelcase provides surveys on their website that can be used by workplaces to help them gain insight into employee desires and opinions of their work environments. Gallagher states that in today's rapid paced world of information technology, "we must put the principles emerging from the multidisciplinary science of places into practice on local and global levels" to secure environmental quality (Gallagher, 1993, p. 19).

Findings and Opportunities

"... [O]ne of the most important aspects of a designer's role is to help change social perception" (Cranz 1998, p. 185).

This chapter has illuminated existing problems with regards to overall well-being, from health issues associated with chairs, sitting, sedentary work, lack of exercise, obesity, and features (or lack of features) in our surrounding environments. How can we solve these problems? We can solve these problems by focusing on health holistically. Taking into consideration all aspects of emotional, social and physical health while planning, designing and operating workplaces is an approach this research study suggests based on literature review and case study findings.

This research study is based on the assumption that employees as well as employers desire mobility and resources in the workplace that support holistic health practices involving factors: biophilia, ergonomics, and exercise. Based on findings in literature review, emotional health directly corresponds to biophilia, ergonomics and exercise. Social encounters and exposure to natural environments affect the mind; and the body is affected by the mind while the mind is affected by the body. Social health is similar to emotional health, affecting the mind, and is directly correlated to biophilia such as with human encounters with other living species. Physical

43

health is related to ergonomics and exercise, as physical health pertains to health of the body, tissue, organs, muscles, bones, nerves. Literature review of existing and previous research supports the assumption that workplace personnel desire holistic health, but also reveals a gap in research. There is a lack of understanding of what employees and employers believe contributes to their personal well-being in the workplace and what they think specifically about the factors of holistic health in their workplaces. This research study proposes questions that address workplace personnel opinions about health that have not recently been asked and methodically documented. The primary research questions below address workplace personnel beliefs about value, productivity, well-being and cost with regards to the holistic health factors: biophilia, ergonomics and exercise.

1) Of the holistic health factors—biophilia, ergonomics and exercise—considered in the workplace, which are valued by employees and employers in the workplace?

2) Of the holistic health factors—biophilia, ergonomics and exercise—considered in the workplace, which are considered by employees and employers to be the most significant contributors to productivity in the workplace?

3) Of the holistic health factors—biophilia, ergonomics and exercise—considered in the workplace, which are considered by employees and employers to be the most significant contributors to well-being in the workplace?

4) At what economic cost are employees and employers willing to implement their preference of holistic health factor(s) into their place of work?

The purpose of secondary research questions below is to follow-up with results of the primary research questions. These questions provide clarifications and illuminate any inconsistencies amongst participants' responses and actions; people do not always do as they say they do.

1) How much does each worker currently walk during a typical work day?

2) What holistic health programs or incentives are currently in place?

3) What are ideal work environments?

Chapter 3

METHODOLOGY

"Jolt subjects into a new awareness of their social existence" (Dhadphale, 2009).

Introduction

Qualitative research was once considered unscientific and naive, but as Christopher Ireland argues, today's world "requires keen understanding of people, cultures and belief systems that may seem completely foreign and unintelligible" (Laurel, 2003, p. 22-23). "It requires patience and an open attitude. It also requires skills and perspectives that are not traditionally taught in design school. Identifying, observing and interpreting human behaviors and attitudes toward design is a discipline in and of itself—it's not easy to 'wing it'" (p. 22.) This research study employs qualitative research design to better understand social complexities within small workplaces.

Positivism is "the view that all true knowledge is scientific, and can be pursued by scientific method" (O'Leary, 2004, p. 10). In order to generate rich data and gain thorough understandings of employees, employers, the workplace, workplace culture, and situations within the workplace requires a post-positivist's view. Investigating social complexities with credibility using the traditional positivist criteria of research is difficult. O'Leary states that, "studies that 'delve deeper'…often involve working with non-random samples; generating mainly qualitative data; conducting research in natural settings; searching for holistic meaning; and recognizing and managing the inherent biases of the researcher" (p. 115). Using a post-positivist's perspective, this thesis study primarily used qualitative and flexible approaches.

A qualitative approach to research is different from a quantitative approach to research in that a qualitative approach allows for more flexibility; it is not always clear exactly what the researcher is looking for and the design tends to emerge during the research process. Because qualitative approaches are quite iterative, a flexible approach allows for iterative processes so that data collection can be thoroughly analyzed. Rigid research processes do not typically accommodate necessary change during data collection, which may be necessary in qualitative approaches.

45

Qualitative research methods are used when investigators seek to uncover and understand theories, communicate visual representations, or measure people's experiences and opinions. Qualitative data is typically represented in the form of words, while quantitative data is typically represented in the form of numbers. Primarily qualitative methods yielded data addressing the primary and secondary research questions of this thesis study (see tables 1, 2 and 3 for visual representation). Qualitative research methods typically yield qualitative data, but can also yield quantitative data. Qualitative data is analyzed thematically, while quantitative data is analyzed statistically. Statistical analysis involves descriptive summaries and conclusions extending beyond immediate data while thematic analysis involves analysis of words, concepts, literary devices, and/or non-verbal cues (O'Leary, 2004, p. 11).

Primary Research Questions: # 1-4	Primary Research Question
Question 1	Of the holistic health factors—biophilia, ergonomics and exercise—considered in the workplace, which are valued by employees and employers in the workplace?
Question 2	Of the holistic health factors—biophilia, ergonomics and exercise—considered in the workplace, which are considered by employees and employers to be the most significant contributors to productivity in the workplace?
Question 3	Of the holistic health factors—biophilia, ergonomics and exercise—considered in the workplace, which are considered by employees and employers to be the most significant contributors to well-being in the workplace?
Question 4	At what economic cost are employees and employers willing to implement their preference of holistic health factor(s) into their place of work?

Table 1. Primary Research Questions

Secondary Research Questions: A, B, C	Secondary Research Question
Question A	How much does each worker currently walk during a typical work day?
Question B	What holistic health programs or incentives are currently in place?
Question C	What are ideal work environments?

Table 2. Secondary Research Questions

Research Design

A variety of methods and methods for data collection ensures robust data, revealed inconsistencies in data and provided transparency of results. Table 1 below represents this research study's methods, also known as "the theoretical, political and philosophical backgrounds to social research and their implications for research practice, and for the use of particular research methods" (Robson, 1993, p. 549). With the intentions for gathering robust data, specific data collection methods were employed. Appropriate for the goals of this research study, the methods of data collection included: literature review, survey, observation, interview, and pedometer reading. Case study and rapid ethnography strategies have been used in support of the chosen data collection methods. The research study was carried out using qualitative, quantitative and flexible approaches, allowing the research process to be a rigorous iterative process and welcoming spontaneous changes and vigilant intuitive decision making.

Primary Research Questions	Approach	Method	Strategy	Data	Analysis
1. Of the holistic health factors—biophilia, ergonomics and exercise—considered in the workplace, which are valued by employees and employers in the workplace?	qualitative & quantitative, rapid ethnography	literature review, survey, observation & interview	flexible & case study	qualitative & quantitative	statistical & thematic
2. Of the holistic health factors—biophilia, ergonomics and exercise—considered in the workplace, which are considered by employees and employers to be the most significant contributors to productivity in the workplace?	qualitative & quantitative	literature review, survey	flexible & case study	qualitative & quantitative	statistical & thematic
3. Of the holistic health factors—biophilia, ergonomics and exercise—considered in the workplace, which are considered by employees and employers to be the most significant contributors to well-being in the workplace?	qualitative & quantitative, rapid ethnography	literature review, survey & interview	flexible & case study	qualitative & quantitative	statistical & thematic

4. At what economic cost are employees and employers willing to implement their preference of holistic health factor(s) into their place of work?	qualitative & quantitative, flexible	literature review, survey & interview	flexible & case study	qualitative	statistical & thematic
Secondary Research Questions					
A. How much does each worker currently walk during a typical work day?	qualitative & quantitative, rapid ethnography	survey, observation & pedometer reading	flexible & case study	qualitative & quantitative	statistical & thematic
B. What holistic health programs or incentives are currently in place?	qualitative & quantitative, rapid ethnography	literature review, survey & interview	flexible & case study	qualitative	statistical & thematic
C. What are ideal work environments?	qualitative & quantitative, rapid ethnography	literature review, survey & interview	flexible & case study	qualitative	statistical & thematic

Table 3. Research Methodology

Strategies and Approaches

Different from fixed design research, flexible design research uses a strategy "where the research design develops (emerges, unfolds) during the process of data collection and analysis" (p. 547). Typically, qualitative data is collected using flexible design research, but quantitative data can also be collected. Although organized and systematically planned prior to data collection, the research design of this particular study was not highly specified prior to the main phase of data collection, as with fixed design research.

As this research study's methods evolved, delving deeper into social complexities within small sedentary workplaces, a case study strategy emerged. Case studies explore 'bounded systems', particular instances or entities that can be defined by identifiable boundaries (O'Leary, 2004, p. 115). Although unlikely to provide representations of populations, case studies allow for "in-depth examination of one particular individual, institution, instance, or occurrence," illuminating social complexities to a body of knowledge (p. 115). Authenticity and richness are goals of any a case study, providing deep understandings that are beyond what is generally

possible in large-scale survey research (p. 116). Case study results may not be generalized, but are still valuable, providing supportive evidence for theories or debunking theories (p.116). This research study is based on the theory that employees and employers value factors of holistic health in the workplace, so a case study strategy is appropriate. This research study does not attempt to generalize findings of this research study.

As with other case studies, the four case studies of this research study have drawn upon a variety of data collection methods such as surveys, interviews and observation; and methodologies such as ethnography (p. 116). This study used surveys, interviews, and observation to collect data; and case studies and rapid ethnography methodologies. Four small workplaces in the United States were recruited for participation in this research study (see Appendix A for recruitment letter). These four offices provide services to either patients or clients (in some instances, "clients" is used to represent patients throughout this research document). Two of these workplaces are financial institutions, both corporate privately owned franchises; and two of these workplaces are privately-owned medical offices, one an office of chiropractic care and the other an office of ophthalmology. In an effort to avoid investigator bias, there were no specific medical or financial office preferences for participant selections. The office selections were random, simply based on the requirements that each office hold sedentary work positions within, and that one of each type (financial or medical) was located in Maricopa County, Arizona, and Glynn County, Georgia. Offices were selected based on office type specifics, recruitment responses and willingness to participate. Each workplace in this research study is considered a case study.

As a part of this qualitative design research study, ethnography was used as a strategy in combination of case studies. Ethnography is seeing things in the other's perspective. A professor described ethnography as a research strategy used "to write a culture." It involves "exploration of the cultural group in a bid to understand, discover, describe and interpret a way of life in the point of view of its participants," which is essentially what this research study seeks to do with employees and employers of small US workplaces (O'Leary, 2004, p. 118). Because this research study was conducted within five months and traditional ethnographic studies usually demand long term data collection, this research study uses rapid ethnography. As methods of collecting data

with an ethnographic approach, observations, surveys, and interviews were used to collect

personal opinions and responses from three participants from each workplace. One of three

participants from each office was an employer, and two participants from each office were

employees. Although more employees or employers of each office could have participated, each

office chose the minimum number of participants to participate in this research study, three—one

employer and two employees.

Methods of Primary Research Data Collection

This research study began with a research proposal for approval from the human subjects

Institutional Review Board (IRB) in September of 2010. Upon recruitment of four small offices in

both Georgia and Arizona, primary research data collection began. Each employee and employer

was asked to complete a self-administered link-specific survey online, designed by the investigator

using Survey Monkey (see Appendix C) to review the survey). Employees and employers

responded to the same survey. The survey consisted of both open questions and closed questions.

Some questions were a similar question asked a different way, so as to catch discrepancies. Open

ended questions are valuable for qualitative research, as they offer space for participants' opinions

and expressions and participants are not limited to answer choices. Coded and analyzed were the

closed-ended questions, which required participants to select answers from already provided

answer selections, although; most closed questions had an "other" answer choice if participants'

felt like further expressing their opinions or reasoning for answer choice. Also, some closed

questions were followed by open questions asking for reasons supporting their previous answers.

If open questions were not addressed, interviews provided opportunities for asking the question

again, and recording of responses.

As previously mentioned, interviewing is "a method of data collection that involves

researchers asking respondents basically open-ended questions" (O'Leary, 2004, p. 162). Using an

interview guide for employers and an interview guide for employees, interviews were conducted

after receiving consent (see IRB approved consent form in Appendix B). Each interview guide

was altered according to survey responses or lack of survey responses per each participant (see

Appendices D and E for interview guides). Each interview was semi-structured and conducted

one-on-one with privacy, allowing conversations to flow naturally. Each interview with the twelve participants lasted anywhere from thirty minutes to just over one hour in duration. These interviews were all transcribed verbatim so that findings could easily be found using a more strategic process of reading and noting findings that correspond to primary and secondary research questions. During interviews, the researcher relies on the interviewee to provide honest and open answers (p. 162). This type of data collection necessitates rapport, honesty, and respect between the researcher and participants. And open, non-judgmental mind is necessary for a successful interview process.

Prior to interviews, two observation days of each workplace lasting in duration of three one-hour intervals were conducted so that interview questions could address questions that arose during observations. Observation is "a systematic method of data collection that relies on a researcher's ability to gather data through his or her senses" (O'Leary, 2004, p. 170). When using observations as a method of data collection, it is important to consider researcher biases and impact on the observed. Robson (1993) notes in "Approaches to Social Research" that "it has been amply demonstrated that what observers 'see' is not determined simply by the characteristics of the thing observed; the characteristics and perspective of the observer also have an effect" (p. 21). Although observations may be a widely understood concept, the data collection method observation is considered a systematic data collection method to design researchers and other post-positivist researchers. Should further research on these particular case studies be of interest to third parties or other researchers, many digital photographs, notes, and sketches were taken and made during the twenty-four hours of observations at all workplaces. Observations were used to collect data pertaining to primary and secondary research questions. For example, plants, both living and artificial, were counted, windows locations, noise levels, tasks, floor plans, work stations and equipment within each participant's workstation were recorded and measured appropriately. Observations were also made with purposes of eliminating and discrepancies in survey responses.

Pedometer readings were used to record mileage walked by each participant during a typical work day, yielding quantitative data. Following all other data collection methods, each participant was given a pedometer, programmed specifically for his/her body, as per directions. Weight,

height, date and time were programmed on each pedometer according to each participant's body. Most participants programmed their own pedometers with assistance from a direction booklet; while I set up others. Pedometers were clipped to participant waist bands during the first thirty minutes of arriving at the office. Participants recorded their mileage and or calories, and steps that were measured by the pedometers from a full work day. The mileage recorded supports or illuminates inconsistencies when compared to previous survey responses regarding participant's values, current behaviors, and thoughts on exercise at work.

Conclusion

This chapter on methodology discussed the approaches, strategies, and methods used in this research study. Should further researchers want to create a similar study in search of comparable findings amongst other workplaces, detailed information on methodological processes has been mentioned in detail. Results of data analysis and the discussion chapter will discuss data analysis processes and findings further.

Chapter 4

RESULTS OF DATA ANALYSIS

Introduction

After surveys, observations, interviews and pedometer readings were administered at the four participating workplaces, data was analyzed using qualitative and quantitative data analysis methods. Survey responses and pedometer readings have primarily been organized into visual graphs and tables, representing numbers. An Ax4 approach was used during observations, noting workplaces' atmosphere, actors, activities and artifacts. Ax4 observation notes, interview responses and pedometer readings were organized into graphs and tables, word clouds and relationship matrixes.

Participants

A total of four workplaces constituting four employers and eight employees participated overall. Ages of participants ranged from twenty-four to fifty-seven. In surveys only, a thirteenth participant participated. This participant was not interviewed or observed, and her mileage walked was not recorded with a pedometer reading. Most survey results noted in the figures of data analysis include a total of thirteen participants; except for when participant(s) skipped a question. Taking into account all methods of data collection, overall the participant number was twelve. Of the twelve participants, job positions consisted of: chiropractor assistant, franchise owner, technician, "front office", chiropractor and owner, tax preparer, optometrist and president, manager, "sales", owner and two office managers, as per responses to the survey.
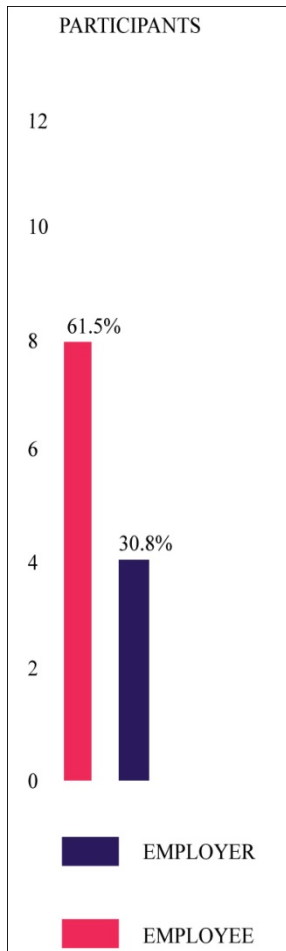
PARTICIPANTS

Figure 9. Participants: employees and employers

Figure 9 displays the number of employers and employees who participated in this research study. Noteworthy, all employers who participated were also men; and all employees who participated were also women.
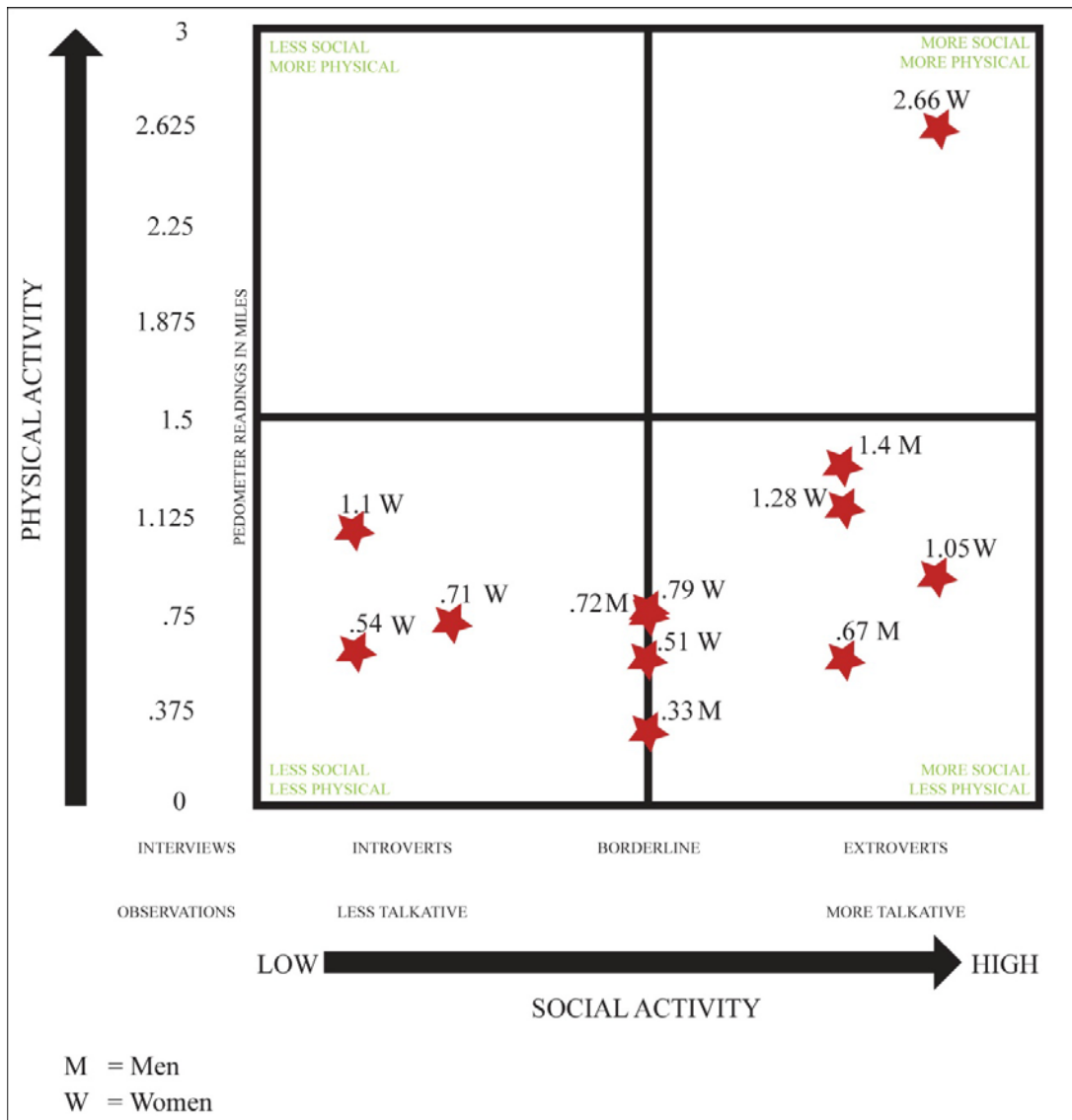
LESS SOCIAL
MORE PHYSICAL

MORE SOCIAL
MORE PHYSICAL

2.66 W

3

2.625

2.25

1.875

1.5

1.125

.75

.375

0

PHYSICAL ACTIVITY

PEDOMETER READINGS IN MILES

1.4 M

1.28 W

1.1 W

1.05 W

.71 W

.72 M .79 W

.54 W

.51 W

.67 M

.33 M

LESS SOCIAL
LESS PHYSICAL

MORE SOCIAL
LESS PHYSICAL

INTERVIEWS   INTROVERTS   BORDERLINE   EXTROVERTS

OBSERVATIONS   LESS TALKATIVE   MORE TALKATIVE

LOW   HIGH

SOCIAL ACTIVITY

M = Men
W = Women

Figure 10. Case study matrix of participants based on social and physical activity

    All twelve participants of surveys, interviews, observations and pedometer readings have been organized into a case study matrix based on their physical and social activity. Depending on mood, life situations, personalities can change on a daily basis; but this matrix was developed with data acquired from pedometer readings, observations of each participant's level of communication and time spent in private offices in the workplace a interview questions that asked whether participants considered themselves to be introverts or extroverts (or somewhere in the middle). Data collected from interviews revealed that five participants considered themselves to be borderline introvert/extrovert. When these interview responses were compared to observation findings, only

one of these participants' responses appeared to be inconsistent. This particular participant stated that she was perhaps both introvert and extrovert; but observations found her to be more lonesome and quiet, more of an introvert in the workplace, as she only spoke to colleagues and clients if they approached her first. Based on participants' interview responses, how much time participants spent in private work spaces and their less talkative or more talkative behaviors exhibited in their workplaces during observation hours, participants have been positioned on the less social or more social side of borderline in Figure 8. Reading from left to right on the less to more social scale,

a) 1.1 W: considered herself to be an introvert, read during lunch, only interacted when people approached her

b) .54 W: considered herself to be an introvert, kept to herself, rarely interacted unless people approached her first

c) .71 W: considered herself to be borderline introvert/extrovert, but only interacted when people approached her

d) .72 M: considered himself to be borderline introvert/extrovert, had a private office and stated he would like more private time, but work requires interaction with people

e) .79 W: considered herself to be borderline introvert/extrovert, spent most time in her private office, but boldly interacted with people at work

f) .51 W: considered herself to be borderline introvert/extrovert, spent most time in her private space, but worked in space open for random interaction and interacted with people at work

g) .33 M: considered himself to be borderline introvert/extrovert, spent most time interacting with colleagues, but had a private office

h) 1.4 M: considered himself to be an extrovert, had private workspace, but spent most time interacting with colleagues

i) .67 M: considers himself to be an extrovert, has private office, but spends most of day interacting with colleagues and clients, boldly interacts with people at work

j) 1.28 W: considered herself to be an extrovert, had private workspace, but spent most of day interacting with colleagues and clients, boldly interacted with people at work

k) 1.05 W: considered herself to be an extrovert, had no private workspace, spent most of day interacting with colleagues and clients, boldly interacted with people at work

l) 2.66 W: considered herself to be an extrovert, had no private workspace, spent most of day interacting with colleagues and clients, boldly interacted with people at work

Participants were recorded through pedometer readings to walk from the least mileage of .33 miles per average work day to the most mileage of 2.66 miles per average work day. The average miles walked during a typical work day for eight participants (four participants that were noted as borderline introvert/extrovert were not included in average calculations) were figured to be .78 miles for the less socially active and 1.41 miles for the more socially active. This data shows that the less social participants walked less than the more social participants in the workplaces. The three participants that have been identified with lower social activity are all women; while the higher socially active participants consisted of two men and two women, and of the participants considered borderline, two were women and two were men. It is important to note that pedometers did not record insignificant movements, such as stepping side to side, but rather, full steps in motion.
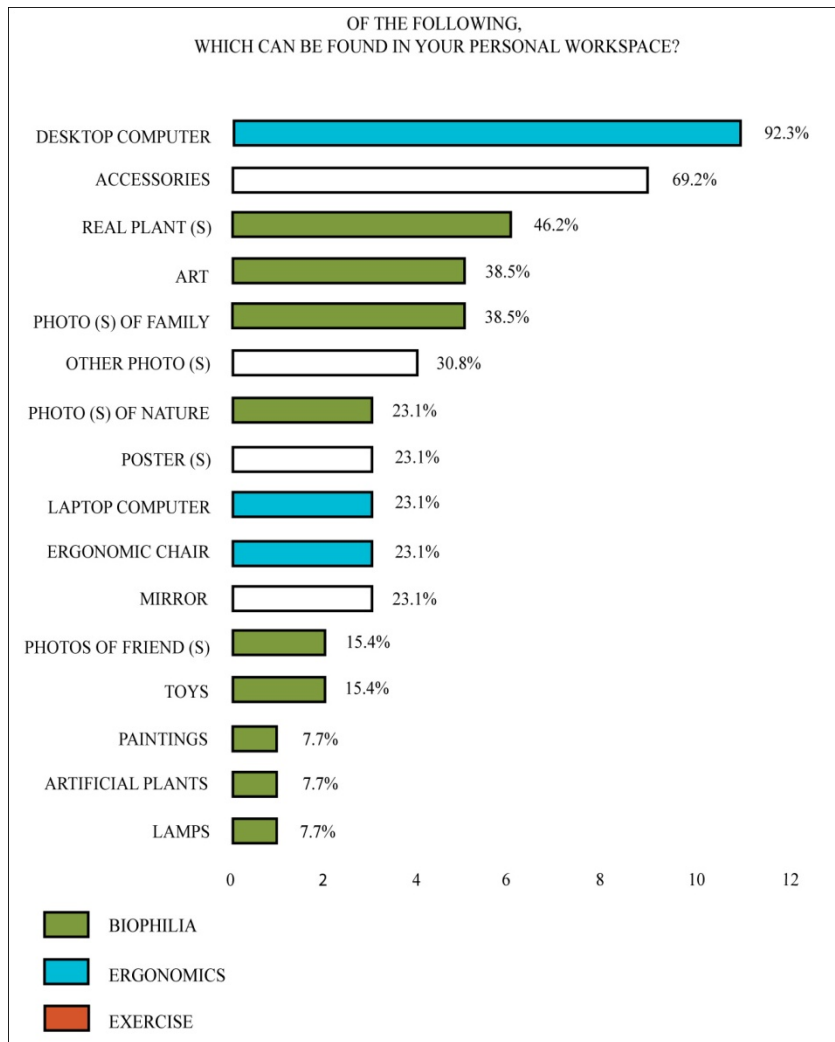
OF THE FOLLOWING,
WHICH CAN BE FOUND IN YOUR PERSONAL WORKSPACE?

DESKTOP COMPUTER	92.3%
ACCESSORIES	69.2%
REAL PLANT (S)	46.2%
ART	38.5%
PHOTO (S) OF FAMILY	38.5%
OTHER PHOTO (S)	30.8%
PHOTO (S) OF NATURE	23.1%
POSTER (S)	23.1%
LAPTOP COMPUTER	23.1%
ERGONOMIC CHAIR	23.1%
MIRROR	23.1%
PHOTOS OF FRIEND (S)	15.4%
TOYS	15.4%
PAINTINGS	7.7%
ARTIFICIAL PLANTS	7.7%
LAMPS	7.7%

BIOPHILIA
ERGONOMICS
EXERCISE

Figure 11. Workspace artifacts

As represented in survey question number seventeen, participants were asked to "select from the following which can be found in your personal workspace." Unspurprisingly, desktop computers ranked highest as artifacts found in workplaces. When participants were asked to "Please select from the following, which can be found in your personal workspace," six participants responded with real (living) plants, just below accessories and desktop computers. Only one participant responded with artificial plants. Remarkably, either some participants believed the synthetic plants to be natural plants or they did not recall the existence of artificial plants in their workplace; because three participants of each workplace responded to this same survey. Five of twelve participants noted that they have family photos in their workplaces, while

59

four noted "other photos" and two noted they have photos of friends. Three participants noted that they have photos of nature and ergonomic chairs in their workplaces.

Interviews yielded data showing that employees and employers valued personal items like photos and meaningful cards from loved ones at work, however; such personal items were not permitted in workspaces. One participant stated: "The fact is that we aren't really supposed to have any personal stuff."
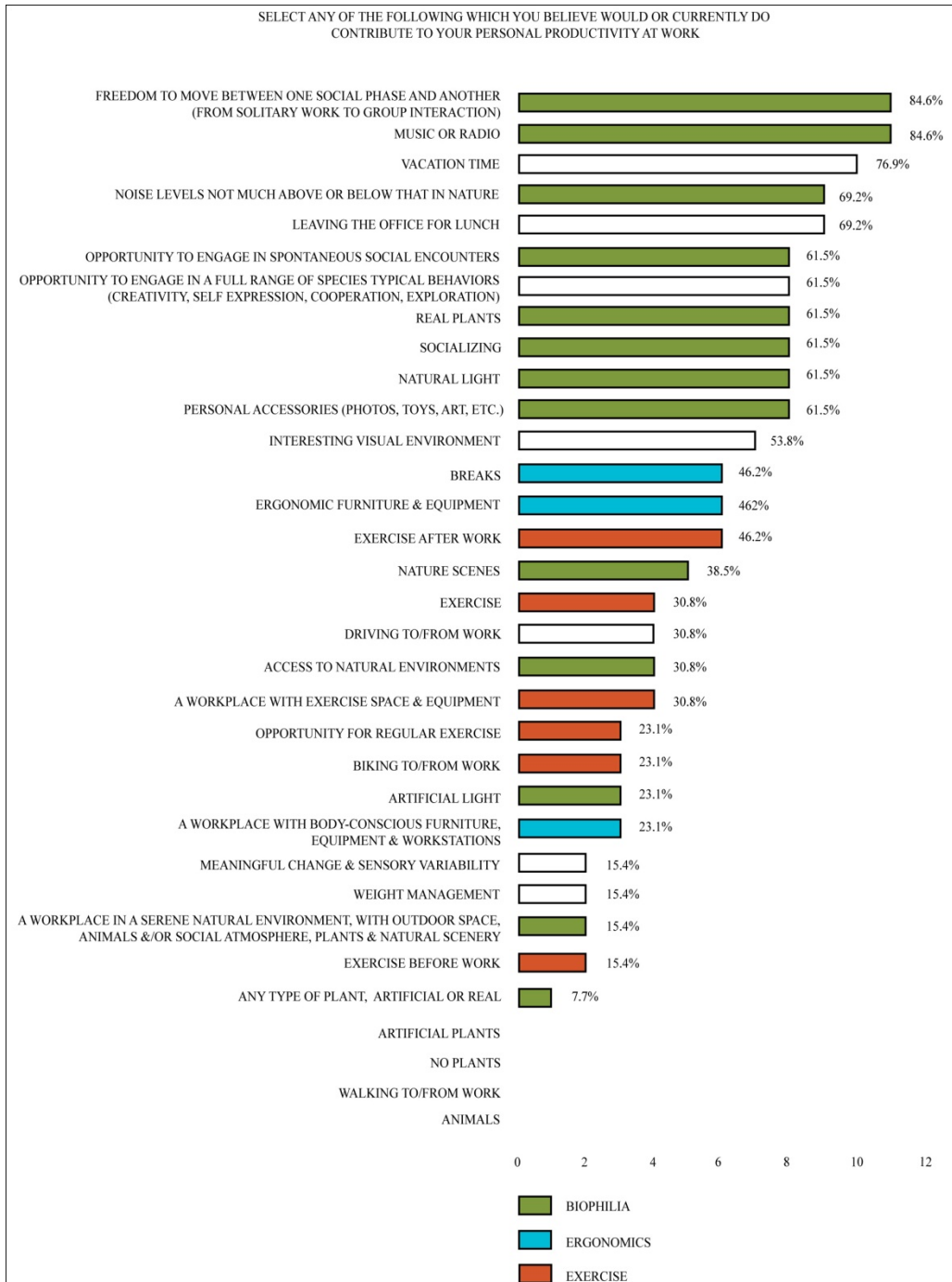
Figure 12. Contributions to personal productivity at work

Survey question thirty-seven, asked participants to "Select any of the following of which you believe would or currently do contribute to your personal productivity at work." Participants were not limited to one answer choice, rather, they selected as many as they wanted. The color coded key illustrates which answer choices are related to biophilia, ergonomics and exercise in this

figure and other representations of data. Through color key illustrations of the holistic health factors: biophilia, erognomics and exercise, these health factors have been indirectly linked to productivity. Unsurprisingly, zero participants believe "artifical plants" and "no plants" have no contributions to their personal levels of productivity in the workplace. No participants believe "walking to/from work" or "animals" to be contributors to personal productivity. No participants chose to respond with an open-ended response. Of the rest of the contributors' answer choices to this question, eleven participants believe "freedom to move between one social phase and another (from solitary work to group interaction)" and "music or radio" currently contribute or would contribute to their personal levels of productivity in the workplace. Following these popular productivity contributors came "vacation time" which ten participants believe contributes to their productivity at work. Perhaps they are stimulated by the thought that they are working towards vacation time; this stimulation helping them to be productive at work. "Leaving the office for lunch" and "noise levels not much above or below that in nature" were also believed to be contributors to personal producitivity levels, as nine participants selected these answer choices. Eight participants believe further contributors to their personal levels of productivityin the workplace are "opportunity to engage in spontaneous social encounters", "opportunity to engage in a full range of species typical behaviors (creativity, self expression, cooperation, exploration", "real plants", "socializing", "natural light", "personal accessories (photos, toys, art, etc.)"; and seven participants believe "an interesting visual environment" contributes to their personal levels of productivity. Fewer than half of the survey participants believe the rest of the answer choices are contributors to their personal levels of producitivity. Included in these are: "exercise after work", "ergonomic furniture and eqiupment", "breaks", "nature scences", "a workplace with exercise space and equipment", "access to natural environments", "driving to/from work", "exercise", "a workplace with body-conscious furniture, equipment and workstations", "artificial light", "biking to/from work", "opportunity for regular exercise", "exercise before work", "a workplace in a serence natural environment, with outdoor space, animals and/or a social atmosphere, plants and natural scenery", "weight management", "meaningful change and sensory variability", "any type of plant, artificial or real".

Survey question twenty-two asked participants to elaborate on their personal productivity at work. When asked what they would change or add in order to improve their productivity at work, twelve of thirteen total participants responded with open-ended answers:

1) Need a couple of computers. One more at the front desk and one for the doctors' desk.

2) Because I assist my staff with their tasks especially when we're busy, I don't get finish a task in a timely manner. To be able to focus on accomplishing a task without interruptions would be a dream come true.

3) I would probably have to limit myself on the internet. I often check Facebook, e-mail, etc. Maybe more administrative duties to keep me occupied while in between patients. That would make me feel like I was more productive.

4) Several high tech optical equipment. Very pricey but could enhance sales of glasses.

5) Not so many incoming calls on complaints

6) Can't think of anything I'd want to change

7) Organizing and keeping things more central

8) Additional people to help with notes, but the cost would outweigh the benefit.
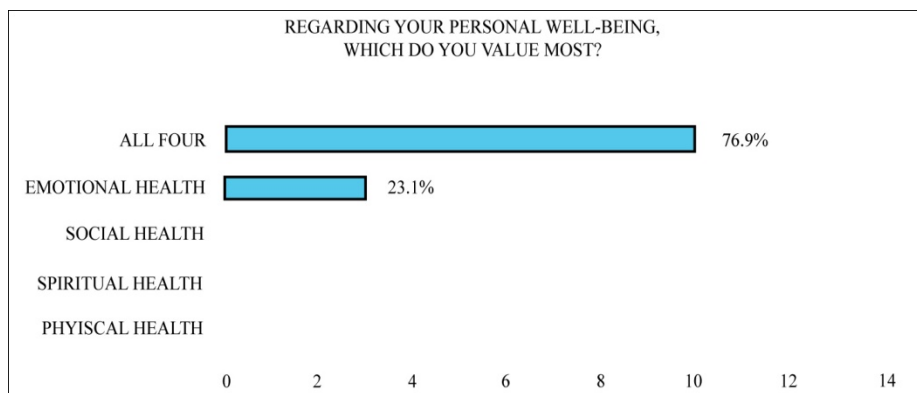
9) four responded "nothing or none"

Figure 13. Well-being values

To eliminate contradictions and better understand participant responses, primary research question number one was asked both directly and indirectly through surveys and interviews. Indirectly, the question of holistic health factor value was asked in surveys through selections of

which type of health each participant valued most: emotional health, social health, physical health, spiritual health, or all four (see Figure 12). Accordingly, as per definitions of biophilia, ergonomics, and exercise, each type of health correlates to each holistic health factor. As previously mentioned in literature review, emotional health directly corresponds to biophilia as well as exercise and ergonomics when mind-body experiences and somatics are considered. Social health is similar to emotional health, directly correlating to biophilia. Physical health clearly links to ergonomics and exercise. Considering the subject of somatics and relationships with nature, spiritual health can be said to be related to emotions as well as ergonomics and biophilia.

For further clarifications, participants were also asked to describe emotional health, physical health, social health, and spiritual health in their own words. Appendices H, I, J and K are word clouds which organize the words participants used to describe their understandings of the four types of health explored in this research study: emotional health, social health, physical health and spiritual health.

Results to survey question thirteen represent thirteen participants' values of health and well-being factors. A majority of participants, ten of thirteen participants, equally value emotional health, physical health, social health and spiritual health. Three participants value emotional health over the physical, social, and spiritual health, believing all other health follows emotional health. One participant stated in an interview, "I tend to be a feeling type of person, so I think when things feel comfortable emotionally that tends to have a trickle effect to all others. …I base things on how I feel emotionally, [so emotional health] probably would be at the top." Another participant elaborated: "I think you have to have a healthy mind before you can have [physical, social, and spiritual health]."

OF THE FOLLOWING, WHICH DO YOU PREFER AT WORK?
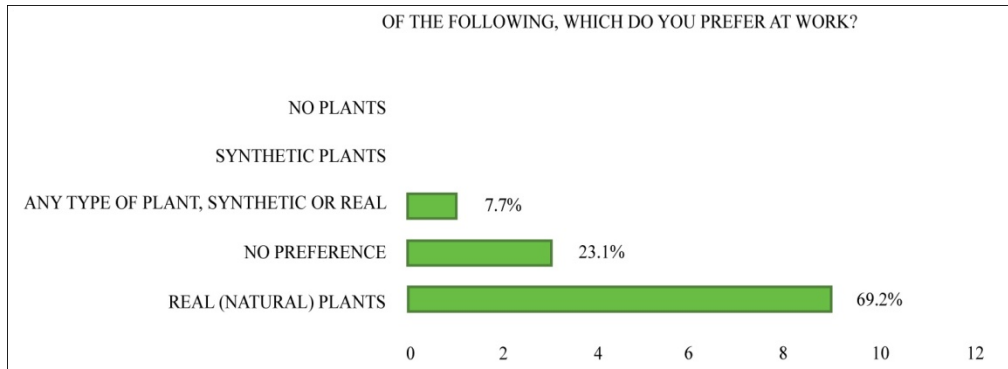
Figure 14. Plant preferences in the workplace

In response to survey question thirty-four, a majority of participants, nine participatns, responded that they have a preference for natural plants in the workplace. Three of the thirteen participants declared no preference, and one participant prefers any type of plant, either living or artificial, over no plants; which could mean these particular four participants have no value of natural plants, compared to the other nine respondents who prefer natural plants to none or artificial plants. No participants prefer synthetic plants or no plants over natural plants.

As a follow up for further clarification, survey questions thirty-five and thrity-six asked if participants currently have living and/or artificial plants in their workplace; and if so, how these make them feel. When participants were asked opened ended survey question thirty-five, "Are there any synthetic/artificial plants in your workplace? If so, how do they make you feel?", five responded no, while eight responded yes. Specifically, two of these participants expressed that they felt indifferent or got no feeling from artificial plants; one participant stated they were nice to see, another that they were ok, another that he/she felt no zeal from them, and another stated that "they add to the decor but still feel sterile".

When participants were asked: "Are there any natural/real plants in your workplace? If so, how do they make you feel?", eleven participants responded yes, while two responded no. Specifically, three respondeds all mentioned how they enjoy growing herbs in their office. Other responses expressed how natural plants made them feel "really good", "more calm", "nice to look at", "nice to see", "I feel hapy and more positive", "I like the concept of nurturing something and

watching it grow", "they are good for the work environemtn and help the air", "we are connected to nature which is a good feelign" and "healthy".

Not all participants who responded to questions thirty-five and thirty-six were aware of the number of natural and/or artificial plants in their workplace. Three participants thought there were no or fewer artificial plants when there were actually one or three. Perhaps they mistook them for natural plants, or did not think about it.
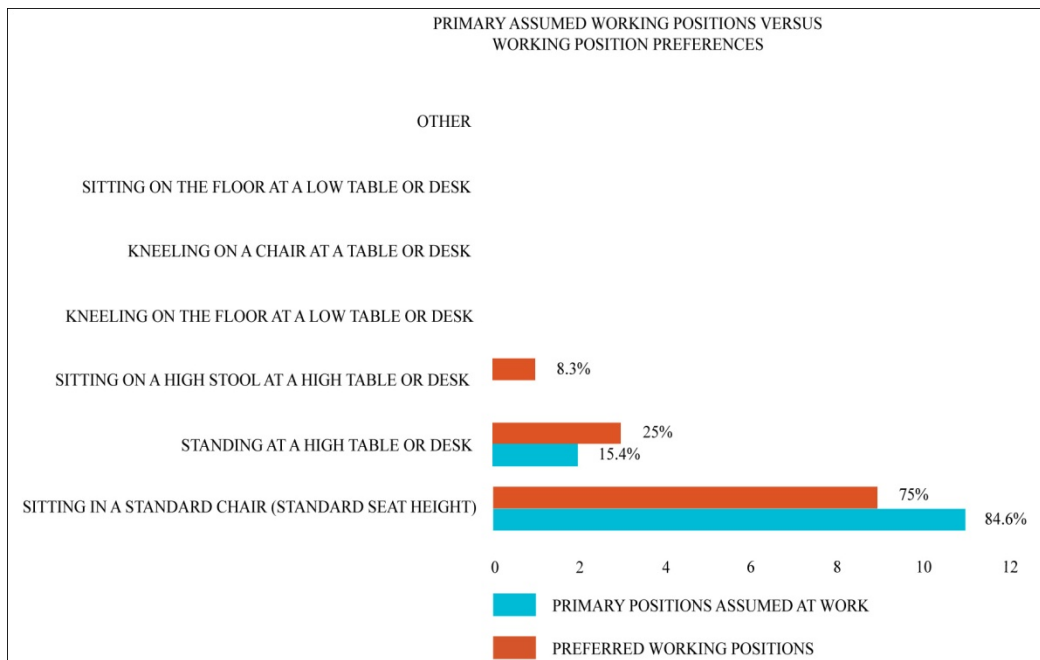

PRIMARY ASSUMED WORKING POSITIONS VERSUS
WORKING POSITION PREFERENCES

OTHER

SITTING ON THE FLOOR AT A LOW TABLE OR DESK

KNEELING ON A CHAIR AT A TABLE OR DESK

KNEELING ON THE FLOOR AT A LOW TABLE OR DESK

SITTING ON A HIGH STOOL AT A HIGH TABLE OR DESK — 8.3%

STANDING AT A HIGH TABLE OR DESK — 25% / 15.4%

SITTING IN A STANDARD CHAIR (STANDARD SEAT HEIGHT) — 75% / 84.6%

0   2   4   6   8   10   12

PRIMARY POSITIONS ASSUMED AT WORK

PREFERRED WORKING POSITIONS

Figure 15. Primary working positions versus preferred working positions

Survey question twenty-six asked participants which working positions they would prefer if they were socially and culturally acceptable in their workplace. Multiple answer choices were selected by participants. Nine of twelve participants who responded to this question selected "sitting in a standard chair" at standard seat height; three participants selected "standing at a high table or desk"; and one participant selected "sitting on a high stool at a high table or desk". When compared to survey question number twenty-five, asking which positions they primarily assume at work, working position preferences of the thirteen survey participants did not differ much from existing working positions. Perhaps some of the answer selections of working positions seem strange and participants have not experienced working in such positions; so they would not know if they had such a working position preference other than what they have already experienced.

In efforts to elaborate on participants' work position preferences, interviews recorded that most employers valued client comfort. One participant stated: "I like sitting; and the concern I have with standing is that the patient is being rushed because…if you want to get something moving, close the chart, stand up."

It would be beneficial to compare results of this study to results of a more interactive action research study testing user experiences of different working positions in the workplace.
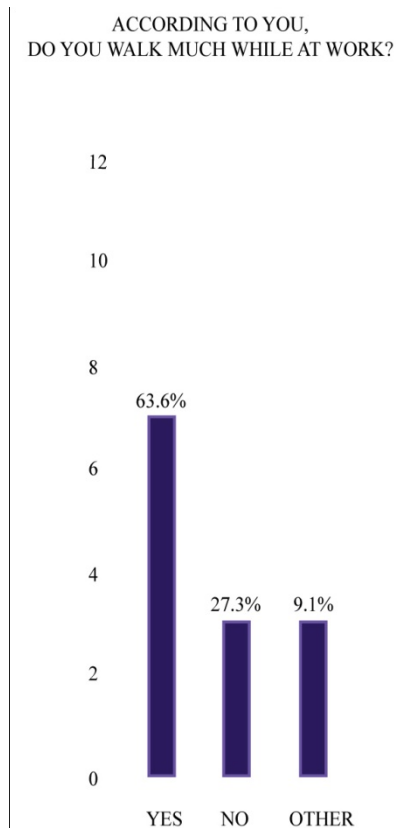
ACCORDING TO YOU,
DO YOU WALK MUCH WHILE AT WORK?

Figure 16. Walk-much opinions compared to pedometer readings

Only eleven participants answered this survey question forty-five which asked, "According to you, do you walk much while working?" Seven participants stated that they believe they do walk much while at work; while three stated they do not believe they walk much at work. One participant selected other, stating "Only when I take a walk." Of the three participants that skipped this question, observations noted that one of those participants did walk much during a typical work day; while the two others did not.
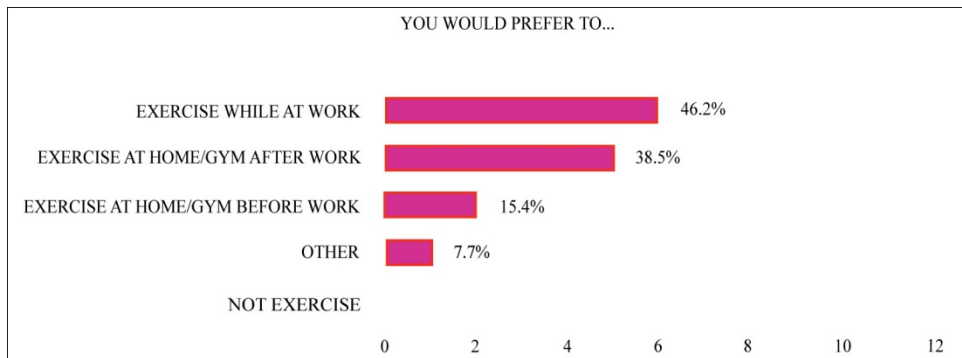
YOU WOULD PREFER TO...

EXERCISE WHILE AT WORK — 46.2%
EXERCISE AT HOME/GYM AFTER WORK — 38.5%
EXERCISE AT HOME/GYM BEFORE WORK — 15.4%
OTHER — 7.7%
NOT EXERCISE

Figure 17. Exercise preferences

According to survey responses to question forty-seven, six out of thirteen participants prefer to exercise while at work, over exercising at home before or after work. Participants were given the option to respond with "other", which one participant selected: "Walking dog after work". Multiple responses to this answer were allowed and selected.

Survey question forty-four asked participants if they exercise outside of work. Thirteen participants responded to this question. Eight participants selected yes, they exercise at home. Two participants selected yes, they exercise at the gym. Two participants selected no; they do not exercise outside of work. Three participants selected "other".

Twelve participants responded to survey question number forty-six, which asked participants if they had heard of a treadmill workstation. Ten participants had not heard of a treadmill workstation; while two had.

All thirteen survey participants responded to question forty-three that they do not walk or bike to or from work; they travel to and from work by motor vehicles. During interviews all participants stated that they would travel to or from work by means other than vehicular transportation, such as biking or walking. Distance is an issue, however. Most participants live thirty minutes away from work, too far to commute by bike or as a pedestrian. Some participants expressed concern for the hot temperature, not liking the idea of showing up to work hot and sweaty.

No exercises were observed occurring in the workplaces during the six hours of observation at each workplace; however, a participant went outside to smoke tobacco cigarettes. Although I did not see this participant outside, I watched her exit the building. Stating in her survey response to

survey question number thirty-three, the participant said she exercises at work, "when I go out and

smoke; [I] try to stretch". Survey question thirty-three asked participants if they ever exercise,

including stretching, at work. Thirteen participants responded:

- Will [occasionally] take a walk on my lunch hour, weather permitting.

- I do stretches periodically

- Sometimes I stretch. I try to stretch my hamstrings. They get tight from standing long

  periods and favoring one leg over the other.

- occasionally

- minimal walking, occasional stretch

- yes when I go out and smoke ~ try to stretch ~

- I walk back and forth to back office frequently and walk about 1 mile (round trip) to

  bank.

- I try to take walks and/or stretch.

- Yes before I start my day, and frequently during the day when explaining stretches to

  patients.

- Four answered either "no" or "not really"

From these responses, six participants mentioned stretching, and two participants mentioned
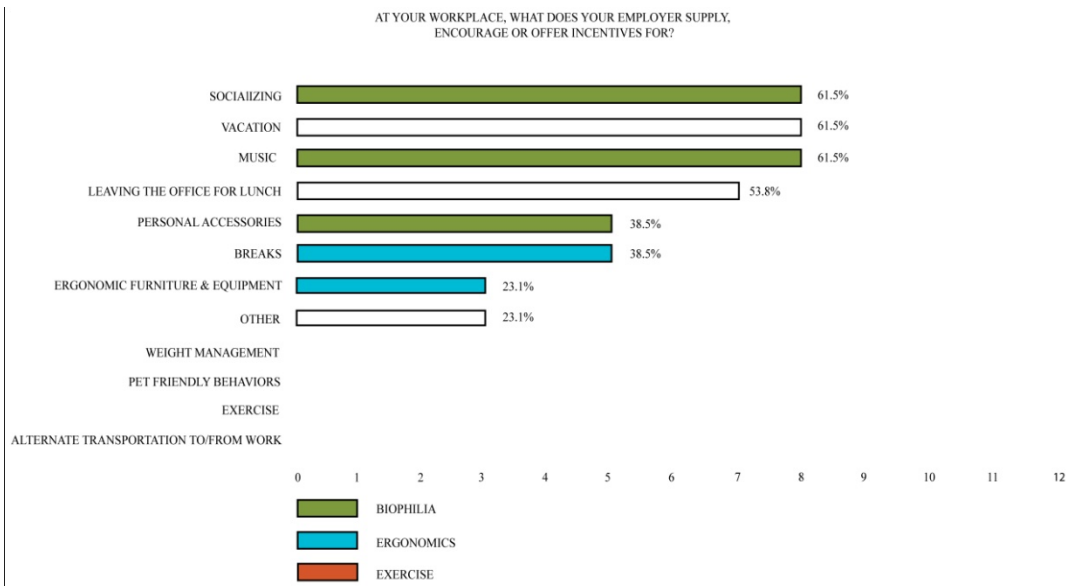
walking during work hours.

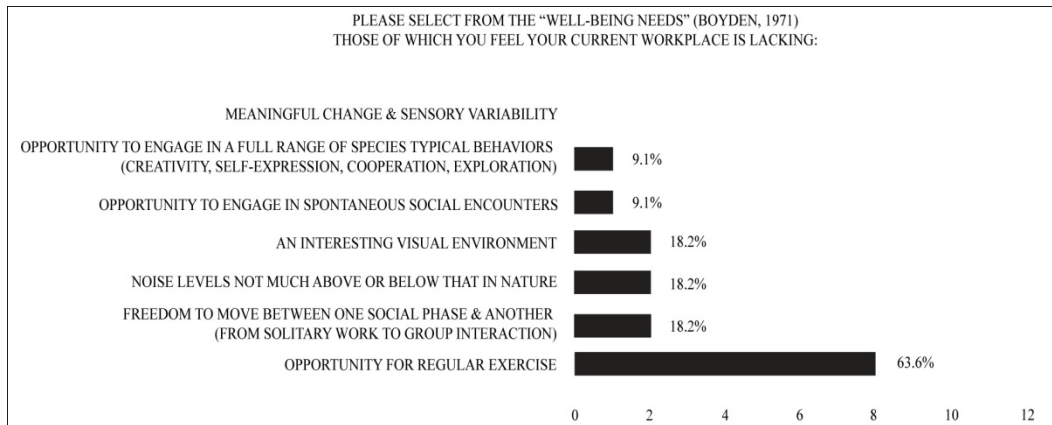*Figure 18.* Encouragements and incentives in the workplace

Thirteen participants responded to this survey question twenty-nine. Eight participants who responded are employees, and four are employers. A majority of participants, eight, claim that their employers encourage socializing, vacation, music. Seven participants claim their employers encourage them to leave the office for lunch; five claim employers encourage personal accessories and breaks; and three participants claim their employers provide ergonomic furniture and equipment in the workplace. Three participants elaborated with as with an extension to "other": "We get bonuses when goals are met", "positive social work environment, no gossip allowed", and despondently, "none". As represented with the colored key of primary holistic health factors: biophilia, ergonomics and exercise, none of the incentives that were claimed to be offered in the participating offices involved exercise.

Supporting incentives for socializing within offices, survey question number fifteen asked participants to respond with an open-ended response to what their favorite characteristic of their workplaces were. Ten of the twelve participants who responded to this question mentioned people in one way or another:

1) The people I work with.

2) The people I work with and for, by far are the best thing about working here.

3) It is small, pleasant and family like. I feel like it is a home away from home.

70

4) How well office employees get along; I've worked at offices where this is non-existent.

5) Completed sales

6) my co-workers

7) The people I have working for me

8) friends at work

9) Interaction with people

10) Having employees who are one team

11) I like to help people with tax questions or problems. Being on top of the tax laws so I can make informed decisions unique for me.

12) The outstanding people I get to work with everyday.

No health programs or incentives were currently in place in any of the four offices for exercise, weight management, alternate transportation to or from work, or pet friendly behaviors, although; interviews further investigated the future of health programs and incentives for employees. One office had space and some equipment for stretching and exercising. They were in the process of bringing the P90X work-out videos into the office for exercise before, during, or after work. This same office offered yoga and tai chi classes to their patients, but because of the schedule of these classes, employees could not participate despite their desire and willingness to. This same office offered incentives for exercise with free gym memberships at a previous time, but canceled the incentives in exchange for health insurance coverage and financial investments for employees.

PLEASE SELECT FROM THE "WELL-BEING NEEDS" (BOYDEN, 1971)
THOSE OF WHICH YOU FEEL YOUR CURRENT WORKPLACE IS LACKING:

MEANINGFUL CHANGE & SENSORY VARIABILITY

OPPORTUNITY TO ENGAGE IN A FULL RANGE OF SPECIES TYPICAL BEHAVIORS
(CREATIVITY, SELF-EXPRESSION, COOPERATION, EXPLORATION) — 9.1%

OPPORTUNITY TO ENGAGE IN SPONTANEOUS SOCIAL ENCOUNTERS — 9.1%

AN INTERESTING VISUAL ENVIRONMENT — 18.2%

NOISE LEVELS NOT MUCH ABOVE OR BELOW THAT IN NATURE — 18.2%

FREEDOM TO MOVE BETWEEN ONE SOCIAL PHASE & ANOTHER
(FROM SOLITARY WORK TO GROUP INTERACTION) — 18.2%

OPPORTUNITY FOR REGULAR EXERCISE — 63.6%

Figure 19. Lack of well-being needs in the workplace

Survey question thirty-nine asked participants to select from Boyden's (1971) "well-being needs" those which participants feel their workplace is lacking. Two participants of the thirteen who participated in the survey skipped this question. Multiple answer choices were selected by participants. A majority of participants, seven participants, felt their workplace was lacking "opportunity for regular exercise". Two participants felt their workplace lacked "freedom to move between one social phase and another", "noise levels not much above or below that in nature", and "an interesting visual environment". Answer choices "opportunity to engage in spontaneous social encounters" and "opportunity to engage in a full range of species typical behaviors" were each believed to be lacking in the workplace by one participant. No participants felt that their workplace is lacking "meaningful change and sensory variability". One participant claimed that his/her workplace was not lacking any of these well-being needs.

Survey question twenty-three elaborated on participants' well-being in their workplaces, as it asked what would they change or add to their workplace in order to improve their health in any way, whether physical, emotional, spiritual, or social health. Eleven of thirteen total participants answered this open-ended question:

1) A better chair.

2) Not have the temperature so cold in the office. The doctors like it really cool.

3) The doctors have mentioned they want to purchase a flat screen TV to put into our yoga room. They want us to be able to watch and do the P90X/Insanity program after work (if

we want to). I personally would love to. We also are started to sell nutritional

supplements. I would like to be able to try them so I can see firsthand if they work or not.

We offer yoga and Tia Chi classes, but none are offered after hours so that I could

participate if I wanted to. Improving my relationship with my co-worker would improve

my emotional health tremendously.

4) humidifier in my office

5) something to exercise with ~ sitting at a desk gets old

6) exercise more. maybe have a treadmill

7) No more air fresheners! They really go for me and I cough with them

8) Cook to make us all healthy meals.

Three participants wrote "nothing" or "none" in response to this open-ended question.
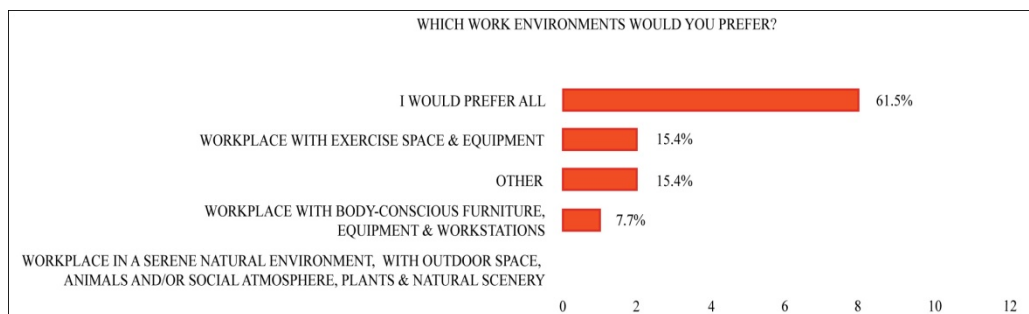
Figure 20. Preferred working environments

When given the choice to select their preferred work environments, a majority of participants,

eight out of thirteen participants, prefer to work in a workplace environment with exercise space

and equipment, serene natural environment with outdoor space, animals and/or social atmosphere,

plants and natural scenery; and body-conscious furniture, equipment and workstations. Two

participants preferred a workplace with exercise space and equipment over the other work

environments. One participant chose only a preference of a workplace with body-conscious

furniture, equipment and workstations. Only one participant believed none of these types of work

environments are possible for his/her job requirements; however, another participant stated: "All

the above sound great, however, would it still be a job?"

WHAT WOULD YOU BE WILLING TO SACRIFICE
IN ORDER TO IMPLEMENT YOUR CHOICE OF:
EXERCISE SPACE & EQUIPMENT,
A SERENE NATURAL ENVIRONMENT WITH OUTDOOR SPACE,
ANIMALS/SOCIAL ATMOSPHERE, PLANTS & NATURAL SCENERY,
BODY-CONSCIOUS FURNITURE, EQUIPMENT & WORKSTATIONS, INTO YOUR WORKPLACE?

SALARY OR PAYMENT CUT

VACATION TIME

HOURS — 30.8%

NONE OF THE ABOVE — 69.2%

0   2   4   6   8   10   12
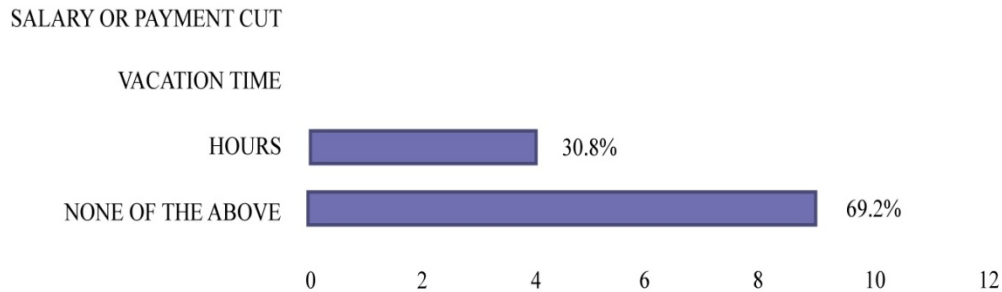
Figure 21. Sacrifices for workplace preferences

Of the thirteen participants who responded to this survey question forty-two, nine selected "none of the above", meaning they would not be willing to sacrifice vacation time, hours, salary or pay cuts in order to implement their preferred work environment(s). Four participants chose hours, meaning they would be willing to sacrifice their hours in order to implement their work environment preference(s). Interviews followed up with these responses so as to clarify whether these participants meant they would be willing to cut back their hours or work longer hours. No participants mentioned any other sacrifices they would be willing to make with "other (please specify)" answer choice. Although multiple answers were allowed to be selected in response to this question, multiple answers were not selected per participant.

During interviews, participants who selected "hours" were asked to clarify their response; did they mean they would be willing to cut their hours back or work longer hours? One of the four participants claimed she would give up her lunch hour to exercise, but she said she cannot cut her hours back, because she is not in a financial position to cut her hours. She needs the hours. "…if I could financially give up an hour to go to the gym everyday and have a membership, I would so do it. There's just no question exercise…mentally helps you with stress." She stated that she would be willing to work more hours in order to get a longer lunch so that she could take an hour during her day (lunch hour) to exercise at a gym near work—if there was or is a gym near work. "I

74

would do it in a heartbeat, definitely." Another of these four participants that selected hours stated: "I would cut my hours, my own personal hours back to do exercise or something like that," he states, but he does not want to cut his work hours back. If his commute was not so forty to forty-five minutes to and from work, he would either use that time for exercise or as family time; "I don't want to work less, I would like to be closer to home…" He concluded with how he might sacrifice his lunch hour to eat at his desk while working so that he could use the lunch hour for exercise; "I could eat at my desk, then work out for an hour or so, have a shower, then come back and maximize my time...". This participant also brought up the interesting fact that he might want to have access to a shower, so that he would not have to return to work sweaty and stinky from exercising. This would require more time for showering, cutting into lunch, exercise or work time. Another participant selected "hours" because she would "…never want to work more; I would always want to work less. I mean, if we could work less hours and still do what we [need to] do that would be great…"
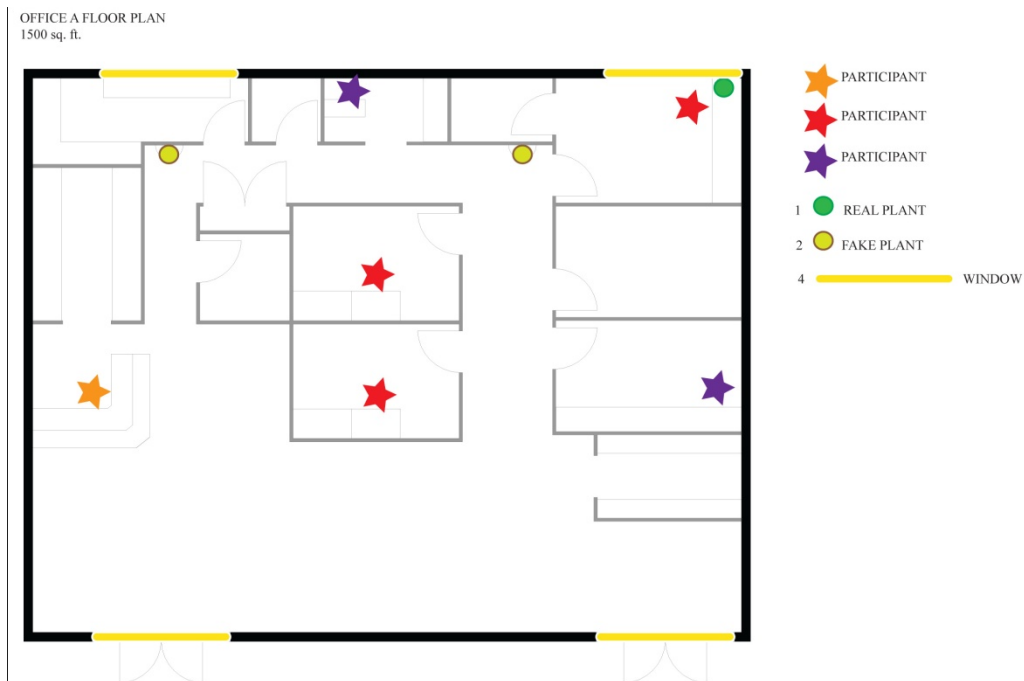
Figure 22. Office A floor plan

One natural plant and two artificial plants were recorded in this office space. Four exterior tinted windows in the office offered views of parking lots, minor landscaping, and an office suite

courtyard of sidewalk and signage. Only two of the primary working spaces had access to natural sunlight, but procedures in this office require artificial light in many of the primary working areas. There was no designated space or equipment for exercise in this office.

Figure 23. Office B floor plan

This office had thirteen living potted plants growing within. Three artificial plants were recorded in this office. The entire front exterior wall consisted of floor to ceiling windows and glass doors. The view through this glass facade consisted of a crowded parking lot, traffic, and a

shopping center. Personnel were separated by partition cubicle walls, allowing sunlight to radiate

through most of the office space. There was no designated space or equipment for exercise in this

office.

Figure 24. Office C floor plan

One living plant and one artificial plant were counted in this office. Four exterior windows

and one interior window and partition walls allowed natural sunlight to extend from the front and

through the office. The interior window allowed personnel to communicate visually through the

window, although they were separated. Partition walls opened up the space, allowing social activity. The view out of the exterior windows consisted of traffic, a parking lot, minor landscaping, mountains, housing, and a canal. There was no designated space or equipment for exercise in this office.

Figure 25. Office D floor plan

Office D had nine windows. The front of the building had quite large windows which let in a great amount of natural sunlight; but the central and rear areas of the building were primarily lit with artificial light. The personnel in these areas had views of the exterior through windows in the rooms across the hall when doors are left open. The purpose of little natural light and primary use of artificial light in areas of this office was to provide their patients with dim therapeutic ambiance. Because personnel within the artificial lit areas of the office moved around quite a bit between spaces, they were exposed to natural light and exterior views through windows in the office. The exterior views of this office consisted of landscaping, traffic, apartments, and a shopping center.

This office had thirteen living potted plants growing throughout, primarily in the front of the building, near patient views.

Marked in purple, this office offered exercise space and some equipment. Primarily for patient use, this area provides office personnel with space for exercising and stretching, should they decide to implement and/or use such opportunities for personnel health programs. Interview findings showed that health programs for personnel using this space are in the works.
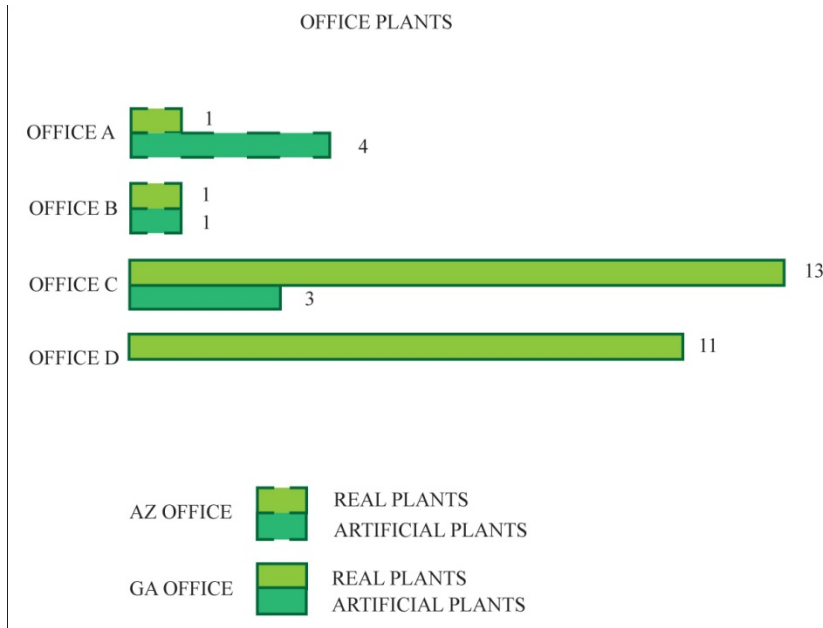

Figure 26. Office plants counted in workplaces, real and artificial

As represented in Figure 26, the highest count of real plants observed in any participating workplace was thirteen. The next highest count of real plants in any participating workplace was eleven. Both of these workplaces with the highest count of real plants were located in Georgia. One of the Georgia offices had no artificial plants, while the other had three. One real plant was counted in both participating offices in Arizona. One of these offices was recorded having four artificial plants and the other had one artificial plant. One participant explained that the purpose of plants in the office is to hide things or create barriers to prevent people from venturing beyond. Noticeably, tall artificial potted trees blocked doorways and traffic flow in that particular workplace.

Most of the participants opened up to me, giving more than simple answers to my many

questions during interview sessions. Interviews were deliberately made to be semi-structured and flexible so that we could develop a personal relationship of comfort and trust with each other over an hour or half hour period of casual conversing about current work environments and personal opinions. Following up the surveys with interviews was beneficial, as it allowed me to fill in the blanks or misunderstandings in the surveys as well as check for any disconnects or changes of opinion.

Interviewees were asked to describe their ideal work environments. Whether they expressed extreme idealistic work environments or minor adjustments to their existing workplaces, was up solely up to them, as the question was not phrased so as to limit potential responses. According to their context of use, responses from twelve participants have been organized into categories: plants, animals, window, lighting, space, furniture, art, personal items, environment, color, exercise, food, and other (see Figure 27).

ART
    1) paintings
    2) art

PERSONAL ITEMS
    1) personal photos
    2) personal effects (photos)

ANIMALS
    1) dog
    2) dog

OTHER
    1) franchise options
    2) internet
    3) one more employee

PLANTS
    1) plants
    2) more plants
    3) more plants

LIGHTING
    1) natural light
    2) brightness
    3) good lighting

FURNITURE
1) new corporate office furniture
2) comfortable chairs and a table in courtyard
3) larger desk
4) more desk to spread out

WINDOW
1) window
2) view outside
3) windows
4) couple more windows
5) a window

FOOD
1) full kitchen
2) food
3) filtered water
4) fridge
5) fresh fruit
6) healthy snacks

EXERCISE
1) walking station
2) full gym
3) weight equipment
4) place to work out
5) pool
6) exercise

COLOR
1) more color
2) vibrant colors
3) color
4) earth tones
5) grays
6) greens
7) blues
8) colors

ENVIRONMENT
1) tropical
2) fresh water
3) relaxing
4) calm
5) beach
6) beach
7) moderate the temperature
8) outside
9) roof-top work space
10) courtyard
11) private soothing courtyard with water feature

SPACE
1) private area
2) more room for clients
3) larger space
4) larger rooms
5) more storage
6) glass walls
7) slate tiles
8) water feature
9) water feature
10) fan
11) new corporate office design
12) indoor work space
13) lounge
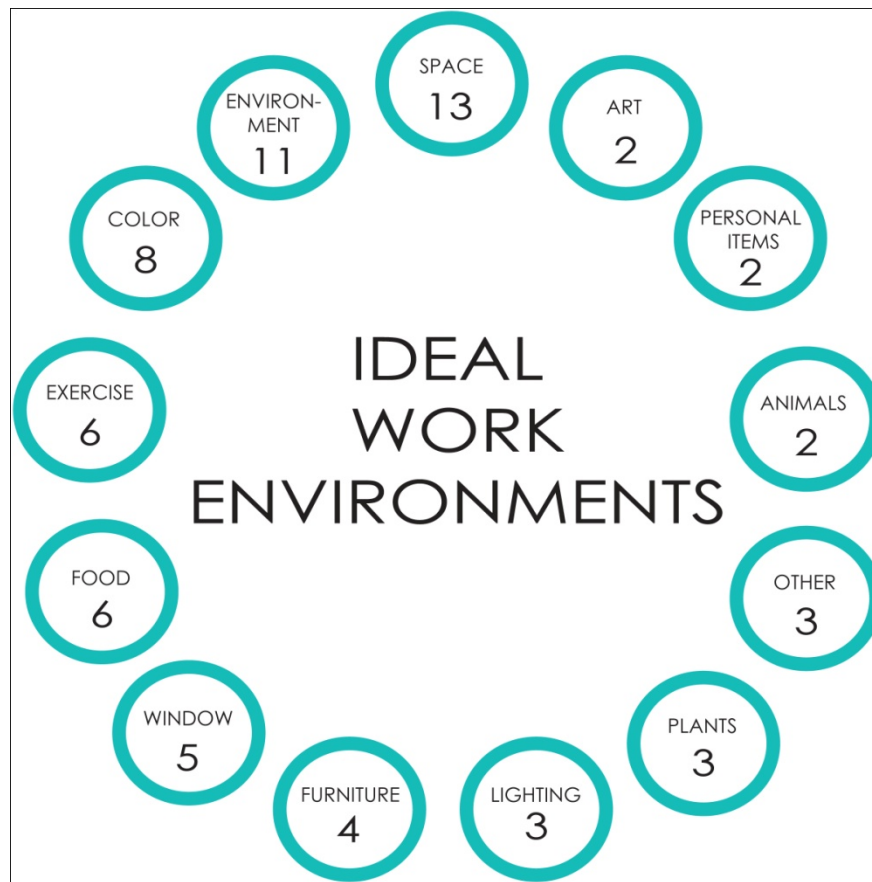
Figure 27. Ideal work environment categories

In addition to obtaining descriptive ideal work environments through interviews, open-ended survey question number nineteen asked participants to state what they would add to or change in their current workplace in order to make it a more comfortable work environment for them. Thirteen participants responded. Three participants responded with no suggestions on how they

would make their existing workplaces more comfortable work environments, however; ten participants responded with suggestions. Similar to the responses collected with ideal work environments in mind, two participants responded with reference to windows; two participants responded in reference to color; three other participants responded in reference to having more space; and three participants responded in reference to personal items. Other suggestions involved control of temperature, music, water feature, less clutter, chair, personal office and relationship with a colleague.

WALK MUCH AT WORK?
PARTICIPANTS' OPINIONS VERSUS PEDOMETER READINGS
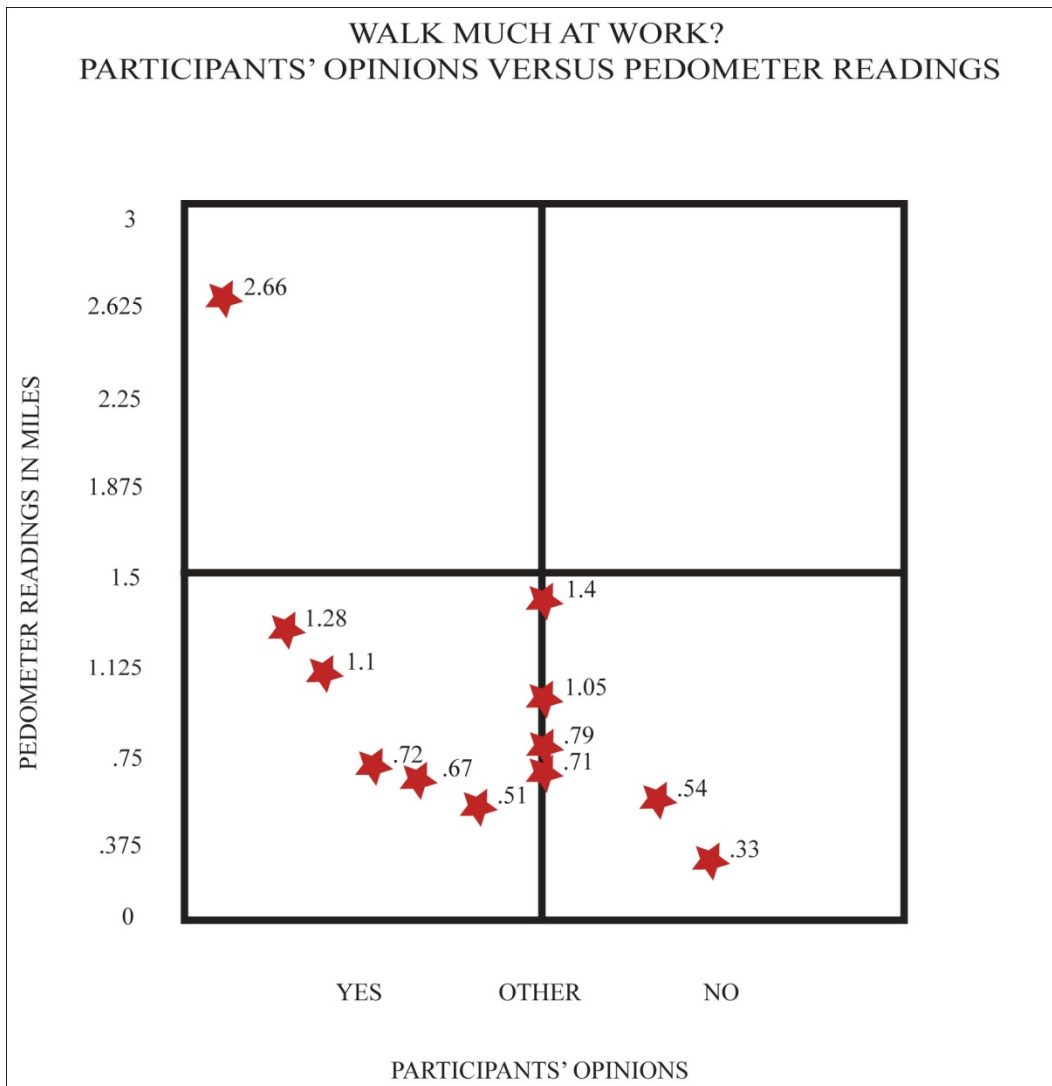
Figure 28. Pedometer readings versus participants' perceptions of whether they walked "much"

Surveys asked whether participants believe they walk much at work. Similar to Figure 10, Figure 28 represents each participant's response to the survey question in addition to each participant's mileage walked during a typical work day, recorded with a full work day pedometer reading. This matrix illustrates that of the participants who consider themselves to walk "much" at work, actually walk between .51 and 2.66 miles during a work day. Only two out of twelve participants consider themselves to not walk much at work. Their mileage was recorded at .33 and .54 miles. Three participants did not specify their opinions with a survey response to survey question number forty-five; and one participant wrote "Only when I take a walk", therefore, their star were labeled accordingly with their recorded mileage and placed in "other" section of the matrix.

Perhaps two pedometer readings should have been recorded per participant, in order to illuminate any inconsistencies or changes in participants' walking patterns. Three participants mentioned in survey and interview responses that they sometimes take walks during the work day. Two of these participants took walks, as mentioned in surveys and interviews, on the day they wore pedometers. One participant recorded 1.1 miles, while the other recorded 1.4 miles. If these two participants did not take typical walks on the days of their pedometer readings, they would have walked .4 miles and .8 miles during their work days.

Pedometer readings have been compared to participants' open-ended survey questions regarding each participant's hours spent at work, hours spent working at a desk, and hours spent working on a computer (See Table 4).

	PEDOMETER READING IN MILES	HOURS AT WORK	HOURS AT DESK	HOURS ON A COMPUTER
A	2.66	8 – 9	0 (stands)	4 +
B	1.4	10	7	6
C	1.28	8	5	4
D	1.1	8	7 – 8	7 – 8
E	1.05	9	8 – 9	8 - 9
F	.79	9	8.1	8.1
G	.72	8	1 (stands)	8
H	.71	8	8	"most of the day"
I	.67	9	8	6
J	.54	8	8	8
K	.51	9	6	6
L	.33	10	8	6

Table 4. Pedometer readings compared to participants' working behaviors

The red numbers in Table 4 marks possible inconsistencies with this particular participant's responses. Although this participant states she works for nine hours on a typical work day, and that she spends six of those hours at a desk and on a computer, observations did not yield consistent data with her response.

Conclusion

As the assumption of this research study proposes, results have shown that employees and employers indeed desire mobility and resources in the workplace that support holistic health practices involving biophilia, ergonomics, and exercise. Table 5 displays primary and secondary research questions addressed in this study with findings associated with each question. In order to follow up with primary research questions, which depended on honest responses, two secondary research questions evaluated existing practices; as people do not always do as they say they do.

Primary Research Questions	Findings
Q. 1	A majority, ten participants, equally valued emotional health, physical health, social health, and spiritual health. Three participants valued emotional health over the physical, social, and spiritual health, believing all other health follows emotional health; therefore, biophilia, ergonomics and exercise were all considered to be valuable to all participants. A majority of participants, eight out of thirteen participants, preferred to work in a workplace environment with exercise space and equipment, serene natural environment with outdoor space, and body-conscious furniture, equipment and workstations.
Q. 2	The most popular answer choices to survey question #37 yeilded a finding representing 84.62% of participants who believed "freedom to move between one social phase and another (from solitary work to group interaction)" and "music" contributed or would contribute to their personal levels of productivity in the workplace.
Q. 3	A majority of participants, seven participants, felt their workplace lacked "opportunity for regular exercise". No participants felt that their workplace lacked "meaningful change and sensory variability".
Q. 4	69.23% of participants were unwilling to sacrifice vacation time, hours, or salary or pay cuts in order to implement their preferred work environment(s). 30.77% of participants were willing to sacrifice their hours in order to implement their preferred work environment(s).
Secondary Research Questions	
Q. A	Participants were recorded through pedometer readings to walk from the least mileage of .33 miles per average work day to the most mileage of 2.66 miles per average work day.
Q. B	Three of thirteen participants claimed their employers provided ergonomic furniture and equipment in the workplace. No health programs or incentives were in place in any of the four offices for exercise, weight management, alternate transportation to and from work, or pet friendly behaviors.
Q. C	When asked to express their ideal workspaces, participants expressed both extreme idealistic work environments and minor adjustments to their existing workplaces. Such ideals included: plants, animals, window, lighting, space, furniture, art, personal items, environment, color, exercise, food, and other.

Table 5. Findings, research findings answer primary and secondary research questions

Chapter 5

DISCUSSION AND CONCLUSION

Introduction

This chapter discusses the results of the data analysis presented in Chapter four. Topics

covered include conclusions about the research questions and assumption, implications for design

and further research. The intent of this research study is not to apply the findings from the four

case studies to other general workplaces, but to illuminate what a small population personally

thinks about their overall well-being in their workplaces; and how these particular workplaces can

attain and promote holistic health in their workplaces. Future research may build upon this study,

expanding the participant size and illuminating further thoughts on holistic health in workplaces.

This conclusion summary also provides an explanation of how this research contributes to the

existing bodies of knowledge within the fields of interior design, industrial design and fashion

design. This research study proposes that employees and employers of these four participating

workplaces desire mobility and resources in the workplace that support holistic health practices

involving biophilia, ergonomics, and exercise. Major design implications for these particular case

studies involve accommodating the workplaces to provide personnel with opportunities for holistic

health in working environments. More specific implications of office related design involve

providing access to natural environments, body-conscious equipment and spaces, as well as

opportunities for exercise and social interaction. These were exposed as contributing factors to

cognitive, social and physical health.

Value

The primary research question about value asks: Of the holistic health factors—biophilia,

ergonomics and exercise—considered in the workplace, which are valued by employees and

employers in the workplace? A majority of participants expressed that they equally valued

emotional health, physical health, social health, and spiritual health; therefore, indirectly,

biophilia, ergonomics and exercise were all considered to be valuable to all participants. A

majority of participants, eight out of thirteen participants, expressed preferences for a workplace

environment with exercise space and equipment, serene natural environment with outdoor space,

animals and/or social atmosphere, plants and natural scenery, and a workplace environment with body-conscious furniture, equipment and workstations. As these particular workplace environments possess elements of the factors biophilia, ergonomics and exercise, all three factors are considered preferrerences in the workplaces of these case studies.

As a majority of participants felt their workplaces lacked opportunity for regular exercise, design implications involve exercise space and equipment, even clothing. Participants were recorded through pedometer readings to walk from the least mileage of .33 miles per average work day to the most mileage of 2.66 miles per typical work day, representing the more sedentary personnel and the more active personnel.

Productivity

The primary research question about productivity asked: Of the holistic health factors—biophilia, ergonomics and exercise—considered in the workplace, which are considered by employees and employers to be the most significant contributors to productivity in the workplace? A marjority of participants believed freedom to move from solitary work to group interaction as well as music contributed or would contribute to their personal levels of productivity in the workplace. Office design and planning might include design elements that cater to social interaction between workplace personnel, as elements and factors that influence and accommodate social health have been noted as contributors to productivity in the four participating workplaces of these particular case studies. Furthermore, the more socially active have been noted to be also the more physically active of workplace personnel.

Well-being

The primary research question about well-being asked: Of the holistic health factors—biophilia, ergonomics and exercise—considered in the workplace, which are considered by employees and employers to be the most significant contributors to well-being in the workplace? A majority of participants, seven participants, felt their workplace lacked "opportunity for regular exercise". No participants felt that their workplace lacked "meaningful change and sensory variability". When asked what a participant thought about how her office might incorporate exercise into their workplace, she said, "I don't see how we could unless we actually took a time

out of our schedule and made time to go for a walk or do something other than on our lunch hour";
but that may not be economically feasible, as she says, "that's taking away from having another
paying patient coming in which could affect out bottom like and someone losing a job". The most
efficient way to incorporate exercise into the workplace, then, seems to be by providing gym
memberships, longer lunches, or workstations that accommodate and offer more body movement,
such as treadmill walk stations or sit-stand working positions.

<div align="center">**Cost**</div>

The primary research question about cost asked: At what economic cost are employees and
employers willing to implement their preference of holistic health factor(s) into their place of
work? More than half (69.23%) of participants stated they were unwilling to sacrifice vacation
time, hours, salary or pay cuts in order to implement their preferred work environment(s). 30.77%
of participants were willing to sacrifice their hours in order to implement their preferred work
environment(s). Participants expressed their willingness to sacrifice hours at work by sacrificing
lunch hour such as with eating at desks, working while eating (which Steelcase stated was already
occurring in workplaces in 2006, *360 article)* in order to spend the actual "lunch hour" exercising,
either at the office or a nearby gym. Transportation time to and from gyms, and shower time at
work and during work hours may not be realistic for all workplaces; so the question is, what is the
proper, most efficient way to implement exercise into the workplace? Vigorous exercise versus
mild exercise preferences need to be determined in order to accommodate concerns for sweat,
stench and shower time associated with vigorous exercise. Mild exercise such as steadily walking
two miles per hour on a treadmill Walkstation will not likely involve as many concerns for
hygiene and professional appearances.

Regarding breaks, one participant stated that she did not think she would still go outside and
stretch if she did not take cigarette breaks. Some breaks, such as lunch breaks, are mandatory in
some workplaces. Are mandatory breaks needed? Some people don't take the time to break or
stretch, but should. As literature review and primary research findings illustrate, some people eat
while they work. Does this affect their productivity or their well-being? Is eating lunch while
working a bad habit? How beneficial is this really? Further research could be explored on this

subject in order to find the most efficient and proper way to implement exercise and breaks into workplaces.

Current Miles

Secondary research question about miles walked at work asked: How much does each worker currently walk during a typical work day? Participants were recorded through pedometer readings to walk from the least mileage of .33 miles per average work day to the most mileage of 2.66 miles per average work day. The average miles walked during a typical work day for eight participants (four participants that were noted as borderline introvert/extrovert were not included in average calculations) were figured to be .78 miles for the less socially active and 1.41 miles for the more socially active. This data shows that the less social participants walked less than the more social participants in participating workplaces. Seeing as most participants felt their workplaces lacked opportunities for exercise and the more socially active personnel were noted as more physically active in the workplace, it may be beneficial for workplaces to consider implementing exercises or physical activity that less socially active personnel would feel comfortable with.

Incentives and Wellness Programs

Secondary research question about existing incentives and wellness programs asked: What holistic health programs or incentives are currently in place? Approximately twenty-three percent of participants claimed their employers provided ergonomic furniture and equipment in the workplace. No health programs or incentives were in place in any of the four offices for exercise, weight management, alternate transportation to and from work, or pet friendly behaviors. All participants stated that they would bike or walk to/from work if they lived closer.

If corporate offices offered incentives and holistic health programs to their franchise owners, perhaps smaller franchise offices would be more inclined to offer health programs and incentives to their employees; this is what the two franchise workplaces of this study suggested. Due to strict corporation rules over franchises and little response to requests from franchise owners, it can be difficult for franchise owners to implement holistic health practices and programs in their own offices despite what they feel would be beneficial for their employees. Since data collection, I noticed that my conversations with participants, especially the employers, have initiated some

thought on programs, policy changes, incentives, and design or decor changes that may provide healthier work environments for them, their staff and even their clients or patients. After learning of the Walkstation during interviews, at least two participants expressed interest for such equipment to their employer.

Are people aware of their options--the variety of furniture and equipment available to them? Ten out of twelve participants had not heard of a treadmill workstation. Wellness coaches and ergonomists are professionals who can educate workplace personnel on healthy work behaviors. Although most participants of this study expressed that they would prefer to work seated in an ordinary chair at a desk of standard height (the accommodations of most participants during the time of the study) participants may not have had experience with alternative options, consequently; they were not truly able to express interest in alternative work positions and furniture options.

Surprisingly, a majority of participants, approximately sixty-one percent, felt their workplace lacked "opportunity for regular exercise". Hygiene, space and time are some factors that may hinder workplace exercise, despite the desires for exercise in the workplace. Mild exercise such as steadily walking two miles per hour on a treadmill workstation will not likely involve as many concerns for hygiene and professional appearances as would rigorous exercise programs. The most efficient way to incorporate exercise into workplaces may be by providing gym memberships, longer lunches, more breaks and workstations that accommodate more body movement, such as sit-stand-walk working stations.

Ideal Work Environments

Secondary research question about ideal work environments asked: What are ideal work environments? Details of participants' ideal workspaces were gathered to enhance future implications in areas of office design. When asked to express their ideal workspaces, participants expressed both extreme idealistic work environments and minor adjustments to their existing workplaces. Such ideals included elements that have been organized into the categories: plants, animals, window, lighting, space, furniture, art, personal items, environment, color, exercise, food, and other. Participants mostly considered elements of space and environment. If designers and

planners were to take such elements into consideration during workplace design, at least for these particular case studies, one might consider storage, water features, room layout, material selections, equipment and furniture. For environmental considerations, designers and planners might accommodate workplaces with soothing atmospheres and outdoor relationships.

Implications for Future Research

Cranz explains (1995) that workplace designers need to consider different ways to sit as well as ways to incorporate a variety of body postures such as lying, squatting, kneeling, standing and sitting into our lives (p. 185, p. 205); but existing positions and reasons for such positions must be explored in order to fully understand how future research and design knowledge of workplace design can do to improve health and enforce preventative proactive measures for workplace personnel while successfully adapting to rapid global changes, information and demands of computer technology. Although most participants of this study expressed that they would prefer to work seated in an ordinary chair at a desk of standard height (the accommodations of most participants during the time of the study) participants may not have had experience with alternative options, consequently; they were not truly able to express interest in alternative work positions and furniture options. A research study that tests participants work productivity and comfort while comparing various work positions would shed more light on true workplace personnel ergonomic preferences, making certain each participant is aware of alternative work positions through experiment experience.

With the goals of this qualitative research study based on collecting opinions of employees and employers, this study laid additional foundation for future studies of workplace health. A future study may collect quantitative data from controlled experiments, monitoring and testing so as to measure the relationships between holistic health factors and productivity and well-being. Longer studies using trial and error, involving action research, could focus on evidence based design, comparing productivity and well-being in current workspaces to productivity and well-being in the re-designed or new work environment adapted to incorporate holistic health practices according to participants opinions and desires, which have been recognized in the data analysis of this study.

Future research addressing exercise preferences and program specifics in the workplace would provide valuable information for action research. In particular, the survey that Waikar and Bradshaw used to determine whether twenty-one businesses in southeast Louisiana provide formal exercise programs or not, the willingness of personnel to participate in formal exercise programs, and employees' preferences regarding features of an exercise program (1995) would provide further beneficial information for implementation of exercise programs into the specific participating offices of this research study as well as other workplaces. More specific questions would assess personnel preferences such as exercise length, degree, location, degree of privacy, embarrassment issues, exercise types, and instructions, as Waikar and Bradshaw determined. Although participants were not allowed an option for "other" or open-ended responses, Waikar and Bradshaw concluded that only three percent of participants indicated that their companies have a formal exercise program; and ninety-seven percent of participants indicated that their company did not have a formal exercise program (p. 23). Of that ninety-seven percent, sixty-nine percent responded that they would be willing to participate in a formal exercise program if one were offered by their company (p. 24). In order to efficiently implement exercise programs into workplaces during working hours, further research exploring recent lunch break behaviors would yield valuable information.

Does climate and geographical location of an office and its employees affect the desire for plants within an office? This may be a reason for the disparity between the numbers of plants in the offices at the two geographies that could also be explored in further research. If residing in the southwestern Sonoran Desert, are personnel less likely to feel a need for indoor plants than those residing near the Atlantic Intracoastal Waterway in southeastern United States? The two offices located at sea level on the east coast—of a humid subtropical climate, barrier islands, marsh hammocks, maritime forests, and lush ecosystems—have a considerably larger number of plants in their workspaces than the two offices located in the rocky and dusty southwest Arizona Sonoran Desert ecosystem with a subtropical arid climate of dessert, succulents and mountains.

Many studies have discovered patterns of human preferences for natural versus urban scenes, supporting the genetic predisposition of the biophilia hypothesis. If there exists an innate desire to

be surrounded by plants, do artificial plants fulfill our innate desire for living organisms, essentially our biophilia predisposition? This research study shows that although three participants stated they had no preference of natural or artificial plants in their workplaces, none of the thirteen survey participants stated they in fact value artificial plants. Further research could explore whether artificial plants fulfill our biophilia needs.

Beyond the scope of this research study, but somewhat related, future research might explore the problem of human-nature disconnect through possible ways of improving human relations with nature through implementation of nature and natural environments in workplace design; yielding the essence of sustainable design, environmentally benign, economically viable and socially equitable design (White, St. Pierre & Belletire, 2009, cover). For example, if images of pristine waterfalls and rainforests draped in rainbows were more common, would fewer people litter or ignore their innate desire to bond with nature, fewer succumbing to materialism and the idea of, "I want it fast and I want it now."? Would such images instill faith; produce more thought and consciousness, remorse?

Implications for Design

What do the findings of this research study mean? "Equipped with good data on which, or how many, people are sensitive to lighting, spatial arrangements, noise, and other ordinary features of our surroundings, architects, office managers, doctors, and the rest of us will be better able to creative more supportive, personalized environments" (Gallagher, 1993, p. 18). As Gallagher has stated, with results of research studies such as this one, data can be applied within interdisciplinary design teams, such as when teams of design, science and business fields collaborate. Interdisciplinary design teams could collaborate to provide valuable insight for office design; such as input from ergonomists, environmental psychologists, interior designers, architects and wellness coaches. More specifically, this chapter discusses findings of this research study that contribute to fields of interior design, industrial design and fashion design in order to create more supportive, personalized work environments that help to increase well-being and improve quality of life. As literature review of this research study has demonstrated that elements of biophilia,

94

ergonomics and exercise affect peoples' well-being and quality of life, perhaps the best way to implement healthy functioning workplaces into US culture is to begin by changing the design within offices.

Interior Office Design

As stated with literature review, today's workplace demands can be stressful and harmful for the body and mind; however, relief can be found. Such things as:

a) freedom to move from solitary work to group interaction,

b) music,

c) opportunities to engage in spontaneous social encounters,

d) opportunity to engage in creativity,

e) self-expression and exploration,

f) appealing visual environments,

g) regular exercise,

h) space for body movements such as exercise, stretching and a variety of working positions,

i) furniture and equipment,

j) noise levels not much above or below that in nature,

k) personal accessories,

l) plant life,

m) association with other species,

n) access to outdoor environments,

o) and sensory variability

are believed by participants of this study as well as other researchers (Gallagher, 1993; Oseland, 2009; Sternberg, 2009) to improve well-being. Such elements can be included in the design phase of work environments in order to promote overall well-being of workplace personnel. Also during design and planning phases of office design, space should be considered for implementation of future innovative health programs and equipment, as some of the case studies have shown that due to a lack of special requirements for exercise space and equipment, they cannot easily implement

exercise into their offices.

More supportive and personalized environments involve personal elements. Personal elements, such as colors preferences and photos, have been noted in this study to contribute to personal productivity, well-being, comfort and productivity in workplaces. Franchises owned by corporate businesses enforce rules and regulations against personal items in workspaces, however; personnel believe personal items are conversation pieces and can help create humanizing experiences for clients and patients alike. Two participants of this study specifically expressed that they felt personal accessories such as photos help to humanize and warm the corporate environment, helping to establish rapport with clients. Personal photos and accessories are conversations pieces. "I think it is also warming to the client…because…it's a conversation piece if it is done the right way." Interior design and industrial design can help address this problem of a lack of personal items in the workplace. Walls or cubicles with personal elements, such as color preferences, built-in photo displays, personal or varying works of art, and options for simple choices in decor may have positive effects on workplace personnel well-being.

Since this research study has recognized that living plants are preferred in these work environments over artificial plants, studying values of plants, both living and artificial, and the many manifestations of artificial plants is beneficial for understanding human behavior and emotions. Further research to be explored on this topic may involve comparing personal preferences of artificial plants to living, as well as dead plants to living plants. Beneficial impacts on the design of workplaces, contributing to productivity of employers and employees in workplaces, may come from such research. Designing workplaces to provide employees and employers with access to the inspiring natural environments and associations with living things, will contribute to human innate desire for living organisms.

Office design and planning might include design elements that cater to social interaction between workplace personnel, as elements and factors that influence and accommodate social health have been noted as contributors to productivity in the four participating workplaces of these particular case studies. It has been found that implementing space and varied work stations that can accommodate diverse body positions and movement are favorable approaches in order to

promote physical, psychosocial and psychological health. Incorporating incentives, activities, practices, space and equipment that accommodate diverse body positions can and should be incorporated into workplaces through planning and design phases. Designers have the ability and skills to promote health and healing environments through interior design and product design, considering the body and mind; whether through designing for ergonomics, interspecies interactions or exercise.

Industrial Design

Product design implications include suggestions from participants of this research study. Such product design include product for body comfort and exercise. Equipment that accommodates body movement, flexibility, comfort and enhances productivity (such as the Walkstation by Steelcase and Dr. James A. Levine) are some examples of products that are desired by participants of the case studies of this research study.

A participant suggested some type of exercise device be used for leg exercises under the desk while working, seated. She described something that you can put underneath a desk to do leg and feet exercises while sitting at work. Another participant specifically mentioned how a re-design of existing office equipment could help him work more comfortably. He expressed concern for when he must constantly turn his back on his patients in order to type information on his laptop computer. He suggested something like a swing arm that provides opportunities for information input without the need to turn away from patients. Another product design implication was mentioned through the use of a software program similar to ergonomic software that alerts computer users when it is time for a break, showing stretches visually. After recently learning about balancing exercises and breathing techniques, this participant suggested some type of software that provides balancing exercise and breathing technique reminders to help her and colleagues practice these exercises.

Changing the public and cultural traditions may be difficult and take a long time, but one can begin implementing change for healthier behaviors in their own environment, at work or home. Cranz and Steelcase offer creative solutions for healthier working positions for our bodies, through interior design (from lighting to textures) as well as furniture design (from rocking chairs

to sit-stand-walk stations). Accommodations to seating can be made for those who may want to rest in a more reclined position as they wait—such as while waiting at the doctor's office. One participating doctor in particular, mentioned how he would consider alternative seating positions at work, but would want to accommodate patients with the same seat height as himself. He would not want to stand; as he believes it would make his patients feel rushed, as if he is not genuinely taking time to listen to them. In such a case, design elements should not only cater to employees and employers within a work space, but also the other users such as clients and patients.

Fashion Design

Perhaps now that we know all participants of this study within small sedentary workplaces of Arizona and Georgia expressed a preference of exercising at work over before or after work and felt their workplaces were lacking opportunities for regular exercise, they will begin to implement exercise practices. Exercise practices include clothing considerations. Depending on whether people prefer intense exercise or mild exercise in their places of work, professional attire that allows for movement and flexibility as well as a material that absorbs moisture and dries quickly would be more appropriate than the materials of typical restrictive pants, skirts, collared or button down shirts and blouses that can be found in professional wardrobes. Shoes are another component of fashion design to be considered in order to successfully implement healthy workplace practices such as exercise. Shoes that possess professional appeal, yet provide flexibility, support, and other practicalities would meet the needs of professional dress as well as comfort and support for a variety of practical movements in the workplace. Such design of both clothing and accessories for professional attire should consider sustainable design initiatives, such as taking into consideration the materials used and their synthetic or natural qualities, bacteria, dyes, toxins, durability, life cycle, reuse, recyclability, processing methods, harvesting and production.

<div align="center">

Conclusion

</div>

As described through literature review in Chapter two, components of holistic health are supported by factors of biophilia, ergonomics, and exercise, which are believed to be significant contributors to well-being and productivity in the workplace. The intersection of science, design

and research design reveals gaps in knowledge of workplace health that can be bridged by future research. Recognizing employees' and employers' perceptions of health and workplace design have implications for a healthier workforce and healthier working environments, productivity gains and happier people. As an unbiased outside design researcher I have begun to tackle the forces that limit the potential of "such visions of sensual rationality from becoming our cultural standard" (Cranz, 1995). This research study was produced out of my desire to improve the well-being of people through improvements in the quality of work spaces. The information presented is a gateway to the possibilities of implementing healthier policies and practices into workplaces that require sedentary work. Acknowledging the results of this study, perhaps small sedentary workplaces within the US will be inspired to inquire their own personnel's thoughts on health practices in the workplace; and even begin implementing health programs that promote psychosocial, physiological and psychological health whether through weight loss, alternative transportation or exercise programs, ergonomic behaviors, or implementation of elements of biophilia such as water features, plants or personal items.

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APPENDIX A

RECRUITMENT LETTER

INFORMATIVE WORKPLACE RECRUITMENT LETTER
Holistic Health Factors in the Workplace: Biophilia, Ergonomics and Exercise

I request the permission of your company to collaborate my thesis research study. I am a Master of Science in Design (MSD) candidate at Arizona State University, Tempe, AZ in the School of Design, and I plan to present my final dissertation in May 2011. I have completed my first year of graduate school, and I will begin conducting research as soon as I receive permission from your company. I have received ASU Institutional Review Board (IRB) approval for this research study. Data collection may not be complete until December of 2010.

The topic of my research is: Holistic Health in the Workplace: Biophilia, Ergonomics and Exercise. I hypothesize that employees as well as employers desire mobility and resources in the workplace that support holistic health factors: biophilia, ergonomics, and exercise—which are significant contributors to well-being and productivity in the workplace. My study of holistic health will encompass physical, psychological, emotional and spiritual health. Biophilia is essentially peoples' love of the outdoors and other species; ergonomics is the appropriate relationship among human activity, the body, and the immediate environment; and exercise is the body's exertion to obtain physical fitness.

I will administer one survey, observe, and conduct interviews with employees and employers at two financial institutions and two private medical practices. One of each workplace will be located in the Glynn County area of Georgia, while the other of each will be located in the Maricopa County area of Arizona. I would like to question, observe and interview two or three employees as well as one to three employers of each workplace. Everyone will remain anonymous and confidentiality will be taken seriously.

Participants will contribute a total of approximately eight hours, six of which will predominantly take place at work. I plan to observe, as inconspicuously as possible, with the use of field notes and still photographs. Unobtrusive observations will require two days of one hour intervals three times a day during typical work days. You will not be required to do anything during observations; please work as you normally do during a typical work day. Following observations, interviews will be recorded with a digital audio recorder and transcribed for data analysis. Interviews and surveys can be scheduled outside of work. Surveys, administered online, will take approximately thirty minutes to complete; and interviews will take anywhere from thirty minutes to an hour. One survey will be administered prior to interviews and observations. Additionally, at some point during this study each participant will be asked to participate in a pedometer reading. Each participant will be issued a pedometer which will be used for tracking the mileage he/she walks during one typical full day of work. Participants will simply be required to start the device after pinning it to their clothing for a full day of work; then record the mileage at the end of the day, and finally, submit the mileage to me via email.

My ASU research committee supports this research and consists of my mentor and committee chair, Professor Philip White, and Professors

Rebecca Barry and James Shraiky.

I would be honored to have your office participate in my thesis research. Please feel free to ask me any questions about my research. You can contact me at 912.248.0189 and amcewan@asu.edu. Should your office choose to participate, surveys, participant recruiting and consent letters will follow. Thank you in advance for your time and consideration. I look forward to hearing from you and meeting with you soon.

Sincerely,

April P. McEwan

Philip White
Committee Chair/Mentor
School of Design &
School of Sustainability
Arizona State University
P.White@asu.edu

APPENDIX B

IRB HUMAN SUBJECT APPROVED CONSENT LETTER

Office of Research Integrity and Assurance

To:	Philip White
	AED
From:	Carol Johnston, Chair
	Biosci IRB
Date:	09/24/2010
Committee Action:	**Expedited Approval**
Approval Date:	09/24/2010
Review Type:	Expedited F4 F7
IRB Protocol #:	1009005495
Study Title:	Holistic Health in the Workplace: Biophilia, Ergonomics and Exercise
Expiration Date:	09/23/2011

The above-referenced protocol was approved following expedited review by the Institutional Review Board.

It is the Principal Investigator's responsibility to obtain review and continued approval before the expiration date. You may not continue any research activity beyond the expiration date without approval by the Institutional Review Board.

Adverse Reactions: If any untoward incidents or severe reactions should develop as a result of this study, you are required to notify the Biosci IRB immediately. If necessary a member of the IRB will be assigned to look into the matter. If the problem is serious, approval may be withdrawn pending IRB review.

Amendments: If you wish to change any aspect of this study, such as the procedures, the consent forms, or the investigators, please communicate your requested changes to the Biosci IRB. The new procedure is not to be initiated until the IRB approval has been given.

Please retain a copy of this letter with your approved protocol.

ASU Herberger Institute
FOR DESIGN AND THE ARTS
ARIZONA STATE UNIVERSITY

OBSERVATIONS, PHOTOS, INTERVIEWS & PEDOMETER READING
INFORMED CONSENT FORM

Holistic Health in the Workplace: Biophilia, Ergonomics and Exercise

INTRODUCTION

This consent form, a copy of which will be left with you for your records and reference, is only part of the process of informed consent. The purposes of this form are to provide you (as a prospective research study participant) information that may affect your decision as to whether or not to participate in this research and to record the consent of those who agree to be involved in the study. It should give you the basic idea of what the research is about and what your participation will involve. If you would like more detail about something mentioned here, or information not included here, you should feel free to ask. Please take the time to read this carefully and to understand any accompanying information.

RESEARCHERS

Both the researcher, April P. McEwan, and her mentor and Principal Investigator, Philip White, Associate Professor of Arizona State University's School of Design, invite you to participate in this research study.

STUDY PURPOSE

The **purpose** of this research is to identify whether the holistic health factors: biophilia, ergonomics and exercise, are valued by employees and employers in addition to whether such factors stimulate and motivate employees and employers, contributing to productivity in the workplace. Additionally, this research seeks to discover at what cost employees and employers are willing to implement access to such holistic health practices.

DESCRIPTION OF RESEARCH STUDY

If you decide to participate, then you will join a study, involving research of employees and employers and their values of and access to the outdoors, living things, ergonomic furniture and equipment, and exercise space and equipment in the workplace, as well as costs employees and employers are willing to pay for facilitation of such into the workplace.

As a participant, you will be asked to participate in:
- a survey
- observations, including photographs of you working in your workspace
- an interview
- a pedometer reading

The researcher will administer a survey online, collect pedometer readings, observe and conduct interviews from and with employees and employers at two financial institutions, two real estate offices, and two private medical practices. One of each type of workplace will be located in the Glynn County area of Georgia, while the other of each will be located in the Maricopa County area of Arizona. Two or three employees as well as one to three employers of each workplace need to be recruited for participation.

Observations will be conducted as inconspicuously as possible with the use of field notes and a digital camera. Following observations, interviews will be recorded with a digital audio recorder and transcribed for data analysis. Additionally, each participant will be issued a pedometer which will be used for tracking the mileage he/she walks during one typical full day of work. As a participant, you will simply be required to start the device after pinning it to your clothing for a typical full day of work; then record the mileage at the end of the day, and finally, submit the mileage to me via email. The pedometer can be worn at your convenience as long as it is worn during a typical day of work.

During observations, the researcher will take photos of the workplace's interior spaces, the workstations of each participant, and even the participant working at work. Photos will be used to identify access to the holistic health factors being studied in this research—biophilia, ergonomics, and exercise. Photos will primarily be used for data analyses. The photos may also be used in presentations and the final thesis document, but faces will be blurred so that identity is masked.

If you say YES, then your participation will last for a total of approximately eight hours, six of which will predominantly take place at your place of work. Observations will require two days of one hour intervals three times a day. You will not be required to do anything during observations; please work as you normally do during a typical work day. Interviews and surveys can be scheduled outside of work. Surveys, administered online, will take approximately thirty minutes to complete; and interviews will take anywhere from thirty minutes to an hour.

If at any point you feel uncomfortable, cannot participate, or do not want to answer a question during surveys, observations, and/or interviews, you may skip the question or remove yourself from participation in this study without penalty.

RISKS
There are no known risks from taking part in this study, but in any research, there is some possibility that you may be subject to risks that have not yet been identified.

BENEFITS
Although there may be no direct benefits to you, the possible benefits of your participation in the research involve contributions to research and education as well as positive, innovative cultural changes for the benefit of employees, employers and workplaces everywhere. Implications of this research involve re-designing workplaces, facilitating and implementing such innovative holistic health systems into workplaces.

CONFIDENTIALITY
All information obtained in this study is strictly confidential. The results of this research study may be used in reports, presentations, and publications, but the researchers will not identify you. In order to maintain confidentiality of your records, the researchers will use subject codes, and consent forms will be secured in a safe place on ASU's campus. Only the Principal Investigator, Philip White, will have access to the confidential information. Upon completion of thesis documentation and presentations, likely May 2011, audio-files, photographs, consent forms, observation and interview notes and surveys will be deleted and/or shredded and discarded.

WITHDRAWAL PRIVILEGE
Participation in this study is completely voluntary. It is ok for you to say no. Even if you say yes now, you are free to say no later, and withdraw from the study at any time.

You have the right not to answer any question, and to stop the interview or remove yourself from observations or a pedometer reading at any time, without penalty. The interview will not be recorded without your permission, nor will photos of you be taken without your permission. You can also change your mind after the interview , pedometer reading, or observations have begun. Please, just let me know.

Please note that participation is voluntary and that nonparticipation or withdrawal from the study will not affect your employment status or penalize you in any way.

If you choose not to participate in this study or remove yourself from participation at any time, any and all data acquired (consent forms, surveys, notes, audio-files, photographs, etc.) will be destroyed.

COSTS AND PAYMENTS

There is no payment for your participation in the study.

VOLUNTARY CONSENT

Any questions you have concerning this research study or your participation in the study, before or after your consent, will be answered by the researcher, April P. McEwan, at amcewan@asu.edu or 912.571.9876, and/or Philip White, Associate Professor, School of Design, Arizona State University, at 480.727.6719 or Mail Code# 1605, Arizona State University, PO Box 871605, Tempe, AZ 85287-1605.

If you have questions about your rights as a subject/participant in this research, or if you feel you have been placed at risk; you can contact the Chair of the Human Subjects Institutional Review Board, through the ASU Office of Research Integrity and Assurance, at 480-965 6788.

This form explains the nature, demands, benefits and any risk of the project. By signing this form you agree knowingly to assume any risks involved. Remember, your participation is voluntary. You may choose not to participate or to withdraw your consent and discontinue participation at any time without penalty or loss of benefit. In signing this consent form, you are not waiving any legal claims, rights, or remedies. A copy of this consent form will be offered to you.

Please place a mark in each box as you read the following to state that you understand and agree to the various parts of this study.

☐ You may be observed for a total of approximately 6 hours; and an interview that will last anywhere from 30 to 60 minutes during my participation in this study. With your   permission, the observations will be photographed and later analyzed and possibly used in research presentations; and the interview will be audio-recorded and later transcribed for data analysis and possibly used in research presentations..

☐ You will wear a pedometer during one full day of work in order to record mileage walked and report the mileage to the researcher as requested.

☐ The photographs, audio-files, interview guides, and transcriptions will not have   names or any other identifying information on them. Your name on the survey will be replaced by an ID code upon retrieval by the researcher..

Your signature below indicates that you consent to participate in this study;
Subject's Signature   Printed Name   Date
Please sign below if you are   granting to the researchers the right to use your likeness, image, appearance and performance - whether recorded on or transferred to audio digital media and photographs - for presenting or publishing this research.

_____   _____   _____
Subject's Signature   Printed Name   Date

INVESTIGATOR'S STATEMENT

"I certify that I have explained to the above individual the nature and purpose, the potential benefits and possible risks associated with participation in this research study, have answered any questions that have been raised, and have witnessed the above signature. These elements of Informed Consent conform to the Assurance given by Arizona State University to the Office for Human Research Protections to protect the rights of human subjects. I have provided (offered) the subject/participant a copy of this signed consent document."

_____   _____   _____
Signature of Investigator   Printed Name   Date   ASU IRB
                                                                          Approved
                                                               Sign Sm
                                                               Date ᵶ   92410-92311

APPENDIX C

SURVEY MONKEY PARTICIPANTS' SURVEY

Survey for research study, Holistic Health in the Workplace: Biophilia,

First, we would like to thank you for your participation! Your participation is contributing to education and the development of new knowledge in design research.

The following information is strictly for the researcher and will only be used for research and educational purposes. Your identity will remain anonymous.

All information obtained in this study is strictly confidential. The results of this research study may be used in reports, presentations, and publications, but the researchers will not identify you. In order to maintain confidentiality of your records, April P. McEwan will use subject codes, and participant information will be secured in a safe place on ASU's campus. Only the Principal Investigator, Philip White, will have access to the confidential information. Upon completion of thesis documentation and presentations, likely May 2011, audio-files, photographs, consent forms, observation and interview notes and surveys will be deleted and/or shredded and discarded.

Any questions you have concerning this research study or your participation in the study, before or after your completion of this survey, will be answered by the researcher, April P. McEwan, at amcewan@asu.edu or 912.248.0189, and/or Philip White, Associate Professor, School of Design, Arizona State University, at 480.727.6719 or Mail Code# 1605, Arizona State University, PO Box 871605, Tempe, AZ 85287-1605.

If you have questions about your rights as a subject/participant in this research, or if you feel you have been placed at risk; you can contact the Chair of the Human Subjects Institutional Review Board, through the ASU Office of Research Integrity and Assurance, at 480-965 6788.

If at any point during this survey you have any questions, please call the facilitator at 912.571.9876. Please understand that you are not obligated to participate in this research. Participation is completely voluntary. If you feel the need to remove yourself from participation in this study, feel free to do so.

Please answer this 50 question survey honestly. You may write as much as you would like in response to the open ended questions. The more descriptive and detailed your answers are, the more beneficial are your answers and time.

Thank you.

1. Please fill in the information requested below:

Your name: (to be replaced by an ID code)

Name of workplace:

City/Town:

Your e-mail:

You may write as much as you would like in response to the open ended questions. The more descriptive and detailed your answers are, the more beneficial are your answers and time.

2. Are you an employee or an employer at this workplace?

◯ Employee

◯ Employer

3. Typically, how many hours a day and how many days a week do you work here?

hours per day:

days per week:

4. How long have you worked at this workplace?

[   ]

5. What is your position or title at this workplace?

[   ]

6. Please describe you primary duties and typical daily tasks at this workplace:

[   ]

7. Briefly describe a typical day at work for you:

[   ]

8. What is your gender?

☐ Female   ☐ Male

9. When you see the phrase, 'emotional health,' what comes to mind?

[   ]

10. When you see the phrase, 'physical health,' what comes to mind?

[   ]

11. When you see the phrase, 'social health', what comes to mind?

[   ]

12. When you see the phrase, 'spiritual health', what comes to mind?

[   ]

13. Regarding your personal well-being, which to you value most?

☐ emotional health   ☐ physical health   ☐ social health   ☐ spiritual health   ☐ all four

☐ Other (please specify)

[   ]

14. Please describe your current workplace environment with as many details as possible:

[   ]

15. What is your favorite characteristic of this workplace?

16. Please describe your personal workspace/workstation(s) at work with as many details as possible:

17. Please select from the following, which can be found in your personal workspace:

- [ ] art
- [ ] photo(s) of nature
- [ ] photo(s) of family
- [ ] photo(s) of friends
- [ ] other photo(s)
- [ ] painting(s)

- [ ] poster(s)
- [ ] desktop computer
- [ ] laptop computer
- [ ] ergonomic chair
- [ ] mirror
- [ ] artificial plant(s)

- [ ] real plant(s)
- [ ] accessories
- [ ] toy(s)
- [ ] lamp(s)

Other (please specify)

18. Please describe any art, accessories, posters, paintings, photos, etc... that you have in your personal workspace(s), why they are there and how they make you feel:

19. If you could change anything about or add anything to this workplace to make it a more comfortable work environment for you, what would you change or add?

20. Hypothetically speaking and assuming it were allowed in your workplace, do you have a pet that you would like to take to work with you? Please explain why you would or why you would not take this pet to work with you if it were welcomed in your workplace:

21. What does the word 'productive' mean to you?

22. If you could change anything about or add anything to this workplace to improve your productivity at work, what would you change or add?

23. If you could change anything about or add anything to this workplace to improve your health in any way, what would you change or add?

24. Approximately how much time do you typically spend working:

at a desk during a typical work day

at a computer during a typical work day

25. Of the following selections, which positions do you primarily assume while working here? (Multiple answers may be selected.)

- [ ] sitting on the floor at a low table or desk
- [ ] sitting in a standard chair (standard seat height is 16-18inches off of the floor) at a table or desk of standard height
- [ ] sitting on a high stool at a high table or desk
- [ ] standing at a high table or desk
- [ ] kneeling on the floor at a low table or desk
- [ ] kneeling on a chair at a table or desk

Other (please specify)

26. If all of the options listed below were socially and culturally accepted and supported in your workplace, how would you prefer to work? (Multiple answers may be selected.)

☐ sitting on the floor at a low table or desk

☐ sitting in a standard chair (standard seat height is 16-18inches off of the floor) at a table or desk of standard height

☐ sitting on a high stool at a high table or desk

☐ standing at a high table or desk

☐ kneeling on the floor at a low table or desk

☐ kneeling on a chair at a table or desk

☐ Other (please specify)

_____

27. Please explain your reasoning for the working position(s) you selected in the previous question:

_____

28. When do you feel most productive at work?

_____

29. Please honestly select any and all that apply: At your workplace, what does your employer supply, encourage or offer incentives for?

☐ exercise

☐ breaks

☐ leaving the office for lunch

☐ alternate transportation to or from work

☐ socializing

☐ pet friendly behaviors

☐ vacation

☐ music or radio

☐ ergonomic furniture and equipment

☐ personal accessories

☐ weight management

☐ Other (please specify)

[_____]

30. Please describe a typical lunch break during a typical work day for you:

31. When and why do you usually take breaks during a typical work day?

32. If you were at work today, what did you do during your lunch break today?

33. Do you ever exercise (including stretching) at work? (Please explain.)

34. Of the following, which do you prefer at work?

○ real (natural) plants

○ synthetic plants

○ any type of plant, synthetic or real

○ no plants

○ no preference

○ Other (please specify)

[   ]

35. Are there any synthetic/artificial plants in your workplace? If so, how do they make you feel?

[   ]

36. Are there any natural/real plants in your workplace? If so, how do they make you feel?

[   ]

37. Select any of the following of which you believe would OR currently do contribute to your personal productivity at work?

- [ ] opportunity to engage in spontaneous social encounters
- [ ] freedom to move between one social phase and another (from solitary work to group interaction)
- [ ] opportunity to engage in a full range of species typical behaviors (creativity, self expression, cooperation, exploration)
- [ ] opportunity for regular exercise
- [ ] noise levels not much above or below that in nature
- [ ] meaningful change and sensory variability
- [ ] an interesting visual environment
- [ ] real plants
- [ ] artificial plants
- [ ] any type of plant, artificial or real
- [ ] no plants

- [ ] exercise
- [ ] breaks
- [ ] leaving the office for lunch
- [ ] walking to/from work
- [ ] biking to/from work
- [ ] driving to/from work
- [ ] socializing
- [ ] animals
- [ ] nature scenes
- [ ] access to natural environments
- [ ] vacation time

- [ ] natural light
- [ ] artificial light
- [ ] music or radio
- [ ] ergonomic furniture and equipment
- [ ] personal accessories (photos, toys, art, etc.)
- [ ] weight management
- [ ] a workplace with exercise space and equipment
- [ ] a workplace in a serene natural environment, with outdoor space, animals and/or a social atmosphere, plants and natural scenery
- [ ] a workplace with body-conscious furniture, equipment and workstations
- [ ] exercise before work
- [ ] exercise after work

Other (please specify)

[_____]

38. Please explain what you do to motivate yourself at work when you are feeling unproductive:

[_____]

39. Please select from the "well-being needs" (Boyden, 1971) those of which you feel your current workplace is lacking:

- [ ] opportunity to engage in spontaneous social encounters

- [ ] freedom to move between one social phase and another (from solitary work to group interaction)

- [ ] opportunity to engage in a full range of species typical behaviors (creativity, self expression, cooperation, exploration)

- [ ] opportunity for regular exercise

- [ ] noise levels not much above or below that in nature

- [ ] meaningful change and sensory variability

- [ ] an interesting visual environment

Other (please specify)

[_____]

40. If you were able to choose between the following work environments, which would you prefer:

- ◯ a workplace with exercise space and equipment

- ◯ a workplace in a serene natural environment, with outdoor space, animals and/or a social atmosphere, plants and natural scenery

- ◯ a workplace with body-conscious furniture, equipment and workstations

- ◯ i would prefer ALL

- ◯ Other (please specify)

[_____]

41. If you selected one answer for the previous question, please explain why you would prefer this work environment over the others:

[_____]

42. What would you be willing to sacrifice, if any, in order to implement your choice of: exercise space and equipment, a serene natural environment, with outdoor space, animals and/or a social atmosphere, plants and natural scenery, body-conscious furniture, equipment and workstations, into your workplace?

○ vacation time

○ salary or payment (cut)

○ hours

○ none of the above

○ Other (please specify)

[   ]

43. You typically travel to and from work by:

○ car

○ walking

○ biking

○ Other (please specify)

[   ]

44. Do you exercise (including stretching) outside of work?

☐ yes, at home

☐ yes, at a gym

☐ no

☐ Other (please specify)

[   ]

45. According to you, do you walk much while working?

○ yes

○ no

○ Other (please specify)

[   ]

46. Have you heard of or seen the treadmill workstation?

○ no

○ yes

○ Other (please specify)

[ ]

47. You would prefer to...

☐ exercise at home or the gym before work

☐ exercise at home or the gym after work

☐ not exercise

☐ exercise while at work

☐ Other (please specify)

[ ]

48. Please describe in detail where the nearest windows and doors are in relation to your primary workstation(s):

[ ]

49. Please describe the view through the window(s) and/or door(s) you mentioned in the previous question.

[ ]

50. While at work during a typical work day, is your workstation/workspace primarily lit with natural sunlight or artificial light?

○ natural sunlight

○ artificial light

○ about equal distribution of natural and artificial light

○ i do not know

○ Other (please specify)

[ ]

APPENDIX D

INTERVIEW GUIDE FOR EMPLOYEES

INTERVIEW GUIDE

ARIZONA STATE UNIVERSITY

Holistic Health in the Workplace: Biophilia, Ergonomics and Exercise

<u>**INTRODUCTION**</u>

As you may now, I am April P. McEwan, a graduate student of ASU's design school. I am conducting research for my thesis. Do you grant me permission to record an interview with you?

Thank you for your participation! Your participation is contributing to education and the development of new knowledge in design research.

Although you have already signed an interview consent form, I will restate some things for you. This interview is confidential; you will remain anonymous. The following information is strictly for the researcher and will only be used for research and educational purposes. Your identity will remain anonymous. If at any point during this interview you have any questions, please ask. Please understand that you are not obligated to participate in this research. Participation is completely voluntary. If you feel the need to remove yourself from participation in this study at any time, please let me know.

Thank you.

HAVE SURVEY TO USE FOR ELABORATIONS.

WARM-UP QUESTIONS

1. How long have you worked here at (name of workplace)?
2. Can you please describe your duties and here at work?
3. What is your position here at work?
4. How many days and hours do you work here?
5. If you value them, please describe from the "well-being needs" (Boyden, 1971) why: opportunity to engage in spontaneous social encounters, freedom to move between one social phase and another (from solitary work to group interaction), opportunity to engage in a full range of species typical behaviors (creativity, self expression, cooperation, exploration), opportunity for regular exercise, noise levels not much above or below that in nature, meaningful change and sensory variability, an interesting visual environment.
6. Do you value your physical, social, spiritual, emotional and/or mental health? Explain.
7. What comes to mind when I mention physical, social, spiritual, emotional and mental health?

PRIMARY QUESTIONS

1. Which do you value most: physical health, social health ("that dimension of an individual's well-being that concerns how he gets along with other people, how other people react to him, and how he interacts with social institutions and societal mores" (Russell 1973, p. 75).), or emotional health? Explain.

2. If you could change anything about or add anything to this workplace to increase your physical, social, spiritual, emotional, and/or mental health for yourself, what would you change or add?
3. What did you do on your break (s) today?
4. What did you do during/where did you go for your lunch break today?
5. What did you do right before work today?
6. What did you do right after work today?
7. How did you get to/from work today?
8. If you could change anything about or add anything to this workplace to make it a more comfortable and/or a better work environment for you, what would you change or add?
9. Thinking of your most recent work day, do you feel you were productive? Explain.
10. If you could change anything about or add anything to this workplace to increase your productivity at work, what would you change or add?
11. If all of the options listed below were socially and culturally accepted and supported in your workplace, how would you prefer to work: sitting on the floor at a low table or desk, sitting in a standard chair (standard seat height is 16-18inches off of the floor) at a table or desk of standard height, sitting on a high stool at a high table or desk, standing at a high table or desk, kneeling on the floor at a low table or desk, kneeling on a chair at a table or desk?
12. If you were able to choose between the following work environments, which would you prefer: exercise space and equipment, a serene natural environment, with outdoor space, animals and/or a social atmosphere, plants and natural scenery, body-conscious furniture, equipment and workstations?
13. Does your employer offer incentives to employees for exercise, weight loss, alternate transportation to or from work, etcetera…? If so, please explain. Have you experienced positive responses to such incentives?
14. At what cost (vacation time, salary/hourly payments (cuts), etcetera…) would you incorporate such incentives?
15. What would you be willing to sacrifice in order to receive such incentives and/or implement your choice of: exercise space and equipment, a serene natural environment, with outdoor space, animals and/or a social atmosphere, plants and natural scenery, body-conscious furniture, equipment and workstations, and "well-being needs" into your workplace? (vacation time, salary or payment (cut), hours, none of the above)
16. If you were able to choose between the following work environments, which would you prefer: a workplace with exercise space and equipment, a workplace in a serene natural environment, with outdoor space, animals and/or a social atmosphere, plants and natural scenery, a workplace with body-conscious furniture, equipment and workstations? Explain.
17. What do you see when you imagine this type of office?

COOL-DOWN QUESTIONS

18. What is your favorite characteristic about this workplace?
19. Of the following, which do you prefer at work: real (natural) plants, synthetic plants, any type of plant, synthetic or real, no plants, no preference?
20. Please describe in detail where the nearest windows and doors are in relation to your primary workstation(s):

21. What do you see through these windows/doors and/or what is on the other side of them?

22. Are there any synthetic or real plants in your workplace? If so, how do they make you feel?

23. Describe your ideal workstation (equipment, furniture, accessories, lighting, view, scenery, tools, technology, etcetera…).

24. What would this ideal workstation do for you? (increase productivity? Provide happiness? Improve health?)

CLOSING COMMENTS

25. Do you have any questions for me?

Thank you very much! I appreciate your time and participation. I will be in contact with your office, and hope to share my research findings with you.

APPENDIX E

INTERVIEW GUIDE FOR EMPLOYERS

INTERVIEW GUIDE

ARIZONA STATE UNIVERSITY

Holistic Health in the Workplace: Biophilia, Ergonomics and Exercise

<u>INTRODUCTION</u>

As you may now, I am April P. McEwan, a graduate student of ASU's design school. I am conducting research for my thesis. Do you grant me permission to record an interview with you?

Thank you for your participation! Your participation is contributing to education and the development of new knowledge in design research.

Although you have already signed an interview consent form, I will restate some things for you. This interview is confidential; you will remain anonymous. The following information is strictly for the researcher and will only be used for research and educational purposes. Your identity will remain anonymous. If at any point during this interview you have any questions, please ask. Please understand that you are not obligated to participate in this research. Participation is completely voluntary. If you feel the need to remove yourself from participation in this study at any time, please let me know.

Thank you.

HAVE SURVEY TO USE FOR ELABORATIONS.

WARM-UP QUESTIONS

1. How long have you worked here at (name of workplace)?
2. Can you please describe your duties and here at work?
3. What is your position here at work?
4. How many days and hours do you work here?
5. If you value them, please describe from the "well-being needs" (Boyden, 1971) why: opportunity to engage in spontaneous social encounters, freedom to move between one social phase and another (from solitary work to group interaction), opportunity to engage in a full range of species typical behaviors (creativity, self expression, cooperation, exploration), opportunity for regular exercise, noise levels not much above or below that in nature, meaningful change and sensory variability, an interesting visual environment.
6. Do you value your physical, social, spiritual, emotional and/or mental health? Explain.
7. What comes to mind when I mention physical, social, spiritual, emotional and mental health?

PRIMARY QUESTIONS

1. Which to you value most: physical health, social health ("that dimension of an individual's well-being that concerns how he gets along with other people, how other people react to him, and how he interacts with social institutions and societal mores" (Russell 1973, p. 75).), or emotional health? Explain.

2. If you could change anything about or add anything to this workplace to increase your physical, social, spiritual, emotional, and/or mental health for yourself, what would you change or add?

3. What did you do on your break (s) today?

4. What did you do during/where did you go for your lunch break today?

5. What did you do right before work today?

6. What did you do right after work today?

7. How did you get to/from work today?

8. If you could change anything about or add anything to this workplace to make it a more comfortable and/or a better work environment for you, what would you change or add?

9. Thinking of your most recent work day, do you feel you were productive? Explain.

10. If you could change anything about or add anything to this workplace to increase your productivity at work, what would you change or add?

11. If all of the options listed below were socially and culturally accepted and supported in your workplace, how would you prefer to work: sitting on the floor at a low table or desk, sitting in a standard chair (standard seat height is 16-18inches off of the floor) at a table or desk of standard height, sitting on a high stool at a high table or desk, standing at a high table or desk, kneeling on the floor at a low table or desk, kneeling on a chair at a table or desk?

12. **How much do you or your clients spend annually on ergonomic related products? ($50,000 annually …)**

13. **Where do you purchase your office furniture and equipment?**

14. **What brands are your office furniture and equipment?**

15. If you were able to choose between the following work environments, which would you prefer: exercise space and equipment, a serene natural environment, with outdoor space, animals and/or a social atmosphere, plants and natural scenery, body-conscious furniture, equipment and workstations?

16. What would you be willing to sacrifice in order to receive such incentives and/or implement your choice of: exercise space and equipment, a serene natural environment, with outdoor space, animals and/or a social atmosphere, plants and natural scenery, body-conscious furniture, equipment and workstations, and "well-being needs" into your workplace? (vacation time, salary or payment (cut), hours, none of the above)

17. If you were able to choose between the following work environments, which would you prefer: a workplace with exercise space and equipment, a workplace in a serene natural environment, with outdoor space, animals and/or a social atmosphere, plants and natural scenery, a workplace with body-conscious furniture, equipment and workstations? Explain.

18. What do you see when you imagine this type of office?

19. **As an employer, do you offer incentives to your employees for exercise, weight loss, alternate transportation to or from work, etcetera…? If so, please explain. Have you had positive responses to such incentives? If not, is this something you would consider implementing into your office if employees showed interest? At what cost (vacation time, salary/hourly payments (cuts), etcetera…) would you incorporate such incentives?**

COOL-DOWN QUESTIONS

20. What is your favorite characteristic about this workplace?
21. Of the following, which do you prefer at work: real (natural) plants, synthetic plants, any type of plant, synthetic or real, no plants, no preference?
22. Please describe in detail where the nearest windows and doors are in relation to your primary workstation(s):
23. What do you see through these windows/doors and/or what is on the other side of them?
24. Are there any synthetic or real plants in your workplace? If so, how do they make you feel?
25. Describe your ideal workstation (equipment, furniture, accessories, lighting, view, scenery, tools, technology, etcetera…).
26. What would this ideal workstation do for you? (increase productivity? Provide happiness? Improve health?)

CLOSING COMMENTS

27. Do you have any questions for me?

Thank you very much! I appreciate your time and participation. I will be in contact with your office, and hope to share my research findings with you.

APPENDIX F

BOWDOIN COLLEGE WORKSTATION ERGONOMIC ASSESSMENT CHECKLIST

WORKSTATION ERGONOMIC ASSESSMENT CHECKLIST

EMPLOYEE INFORMATION

Employee: _____   Assessor: _____   Location: _____

Supervisor: _____   Contact: _____   Date: _____

Reason for
Assessment:

The Assessor will interview the employee regarding the following questions:

1. How many hours a day are spent in the primary posture (i.e., at the computer)?

2. How many hours a day are spent in task-specific postures (i.e., answering the phone, carrying loads?)

3. What is the employee's dominant hand? Is the complaint related to the dominant hand or wrist/arm/shoulder?

4 Does the employee wear prescription eyeglasses when working? If so, are they bifocal/trifocal type?

5. Has the employee previously complained of a similar or related issue? If so, when, and what actions were taken?

6. Has the employee had an ergonomic assessment performed previously? If so, were the recommendations of that assessment implemented as stated?

7. Does the employee engage in outside activities that may have contributed to or aggravated the complaint? If so, what are they, and what frequency are they engaged in?

8. Has the employee previously been treated for an ergonomically-related condition, occupational or otherwise? If so, was it similar to the complaint, and/or resolved to the satisfaction of the employee and their care provider?

9. Does the employee have an ADA-compliant condition that needs to be addressed for their workstation? If so, what is it?

10. Does the employee generally engage in good ergonomic practices at their workstation (i.e., posture, stretching, rest breaks, etc.)?

The Assessor will address the listed Key Issues and complete the questionnaire on the opposite side of this worksheet, and make appropriate recommendations below:

Recommendations:

Rearrange workstation	-
Adjust/replace chair	-
Pads and/or rests	-
Orthopedic input devices	-
Adjust/improve lighting	-
Adjust posture, tasks	-
Break schedule/software	-
Stretching program	-
Employee education	-
Other (specify)	-

A copy of this assessment has been provided to the employee, their Supervisor or Department head, and HR for reference.
A followup contact will be made by the Assessor to the employee and their supervisor within 30 days - DATE COMPLETED:

INITIALS: _____

WORKSTATION ARRANGEMENT

☐ Frequency of Use/Task	☐ Reaching, Stretching, and Crossovers	☐ Other (Specify) _____
☐ Sequence of Use/Task	☐ Repetition Rates of Tasks	
☐ Relative Importance of Tasks	☐ Recovery Time Between Tasks	YES NO

Bowdoin College
Office of Environmental Health Safety

Revision 02.22.05

WORKSTATION ERGONOMIC ASSESSMENT CHECKLIST

1. Backrest of chair provides adequate and comfortable lumbar support
2. Seat width and depth appropriate for user's hips and thighs
3. Seat front does not press against back of knees and lower legs when sitting fully in chair
4. Seat pan is level, cushioned, and has a rounded "waterfall" front edge
5. Arm rests (if present) support both forearms equally, and do not interfere with movement or posture
6. Sufficient clearance for feet and legs under work surface, to prevent reaching with arms
7. Sufficient clearance between thighs and bottom of work surface
8. Sufficient area and task lighting provided without causing glare
9. Working surface large enough and at correct height for tasks
10. Commonly accessed items (files, binders, etc.) within easy reach, not stored above shoulder level
11. Office machines (printer, fax, etc.) located to prevent excessive motion or reaching
12. Telephone located to prevent crossbody reaching or uncomfortable use positions
13. Workstation furniture and equipment sufficiently adjustable to allow changes
14. Workstation furniture and equipment in serviceable conditon and functioning properly
15. Tasks are organized to allow variability with other activities, breaks, and recovery pauses

WORKING POSTURES

☐ Neutral Postures	☐ Potential for Cumulative Trauma
☐ Dynamic Postures	☐ Aggravation of Pre-Existing Conditions
☐ Stable Center of Gravity	☐ Circulation and Nerve Interference

☐ Other (Specify) _____

YES   NO

1. Head and neck upright, in-line with torso, and not bent down or back
2. Head, neck and torso face forward, not twisted
3. Torso perpendicular to floor, back straight
4. Shoulders and upper arms in-line with torso, not elevated or stretched forward
5. Upper arms and elbows held close to the torso, not extended or akimbo
6. Forearms, wrists, and hands held straight and in-line, perpendicular to upper arms
7. Wrists and hands held straight (not bent up, down, or sideways) and relaxed
8. Thighs parallel to floor, and lower legs perpendicular to floor
9. Feet rest flat on the floor, or supported by a stable footrest
10. Awkward postures being avoided by good personal workstation arrangement
11. Telephone not being cradled between head and shoulder when in use, or headset is in use
12. Use of office equipment etc. does not require awkward postures, excessive reaching, or discomfort
13. User is generally relaxed and non-fatigued during performance of tasks
14. Stretching, breaks, recovery resting, and/or task variation being used
15. Employee is aware of basic workstation ergonomics, and common causes of general repetetive stress injuries

COMPUTER USE

☐ Frequency of Breaks	☐ VDT Training
☐ Use of Orthopedic Devices	☐ VDT Arrangement

☐ Other (Specify) _____

YES   NO

1. Top of monitor at or below eye level, screen contents 0-15° below line of sight
2. Users with glasses can see the screen without bending neck backward or forward
3. Monitor at proper distance (18-24") and angle to avoid tilting head forward or back
4. Monitor located so as to avoid direct or reflected glare, and adjustable for brightness and contrast
5. Secondary screens or document holders postioned at same hieght, distance, and adjacent to monitor
6. Monitor and keyboard set directly in front of user to prevent twisting of head or torso
7. Keyboard tray large enough to use input devices comfortably, and adjustable for height
8. Input devices (mouse, keypad) located close enough and at correct height to avoid reaching
9. Input devices (mouse, keypad) designed for and/or located on a surface that avoids wrist stress
10. Input devices (mouse, keypad) being used lightly, not gripped or used forcefully
11. Wrists and hands do not rest on hard surfaces or edges
12. Wrists and hands lie comfortably straight and in-line, not bent back
13. Regular breaks (at least 10 minutes per hour) being taken, and/or reminder software being used
14. Stretching being done regularly throughout work day
15. Employee is aware of VDT issues, and common causes of computer-specific repetetive stress injuries

NOTES:

APPENDIX G

OSHA ERGONOMIC SOLUTIONS EVALUATION CHECKLIST

Evaluation Checklist

WORKING POSTURES–The workstation is designed or arranged for doing computer tasks so it allows your	Y	N
1. Head and **neck** to be upright, or in-line with the torso (not bent down/back). If "no" refer to Monitors, Chairs and Work Surfaces.		
2. Head, neck, and **trunk to** face forward (not twisted). If "no" refer to Monitors or Chairs.		
3. Trunk to be perpendicular to floor (may lean back into backrest but not forward). If "no" refer to Chairs or Monitors.		
4. Shoulders and **upper arms** to be in-line with the torso, generally about perpendicular to the floor and relaxed (not elevated or stretched forward). If "no" refer to Chairs.		
5. Upper arms and **elbows** to be close to the body (not extended outward). If "no" refer to Chairs, Work Surfaces, Keyboards, and Pointers.		
6. Forearms, wrists, and **hands** to be straight and in-line (forearm at about 90 degrees to the upper arm). If "no" refer to Chairs, Keyboards, Pointers.		
7. Wrists and **hands** to be straight (not bent up/down or sideways toward the little finger). If "no" refer to Keyboards, or Pointers		
8. Thighs to be parallel to the floor and the **lower legs** to be perpendicular to floor (thighs may be slightly elevated above knees). If "no" refer to Chairs or Work Surfaces.		
9. Feet rest flat on the floor or are supported by a stable footrest. If "no" refer to Chairs, Work Surfaces.		

Notes:

SEATING–Consider these points when evaluating the chair:	Y	N
10. Backrest provides support for your lower back (lumbar area).		
11. Seat width and **depth** accommodate the specific user (seat pan not too big/small).		
12. Seat front does not press against the back of your knees and lower legs (seat pan not too long).		
13. Seat has cushioning and is rounded with a "waterfall" front (no sharp edge).		
14. Armrests, if used, support both forearms while you perform computer tasks and they do not interfere with movement.		
"No" answers to any of these questions should prompt a review of Chairs.		

Notes:

KEYBOARD/INPUT DEVICE–Consider these points when evaluating the keyboard or pointing device. The keyboard/input device is designed or arranged for doing computer tasks so the	Y	N
15. Keyboard/input device platform(s) is stable and large enough to hold a keyboard and an input device.		
16. Input device (mouse or trackball) is located right next to your keyboard so it can be operated without reaching.		
17. Input device is easy to activate and the shape/size fits your hand (not too big/small).		
18. Wrists and **hands** do not rest on sharp or hard edges.		
"No" answers to any of these questions should prompt a review of Keyboards, Pointers, or Wrist Rests.		

Notes:

MONITOR–Consider these points when evaluating the monitor. The monitor is designed or arranged for computer tasks so the	Y	N
19. Top of the screen is at or below eye level so you can read it without bending your head or neck down/back.		
20. User with bifocals/trifocals can read the screen without bending the head or neck backward.		
21. Monitor distance allows you to read the screen without leaning your head, neck or trunk forward/backward.		
22. Monitor position is directly in front of you so you don't have to twist your head or neck.		
23. Glare (for example, from windows, lights) is not reflected on your screen which can cause you to assume an awkward posture to clearly see information on your screen.		
"No" answers to any of these questions should prompt a review of Monitors or Workstation Environment.		

Notes:

WORK AREA–Consider these points when evaluating the desk and workstation. The work area is designed or arranged for doing computer tasks so the	Y	N
24. Thighs have sufficient clearance space between the top of the thighs and your computer table/keyboard platform (thighs are not trapped).		
25. Legs and **feet** have sufficient clearance space under the work surface so you are able to get close enough to the keyboard/input device.		

Notes:

ACCESSORIES–Check to see if the	Y	N
26. Document holder, if provided, is stable and large enough to hold documents.		
27. Document holder, if provided, is placed at about the same height and distance as the monitor screen so there is little head movement, or need to re-focus, when you look from the document to the screen.		
28. Wrist/palm rest, if provided, is padded and free of sharp or square edges that push on your wrists.		
29. Wrist/palm rest, if provided, allows you to keep your forearms, wrists, and hands straight and in-line when using the keyboard/input device.		
30. Telephone can be used with your head upright (not bent) and your shoulders relaxed (not elevated) if you do computer tasks at the same time.		
"No" answers to any of these questions should prompt a review of Work Surfaces, Document Holders, Wrist Rests or Telephones.		

Notes:

GENERAL	Y	N
31. Workstation and equipment have sufficient adjustability so you are in a safe working posture and can make occasional changes in posture while performing computer tasks.		
32. Computer workstation, components and accessories are maintained in serviceable condition and function properly.		
33. Computer tasks are organized in a way that allows you to vary tasks with other work activities, or to take micro-breaks or recovery pauses while at the computer workstation.		
"No" answers to any of these questions should prompt a review of Chairs, Work Surfaces, or Work Processes.		

Notes:

APPENDIX H

EMOTIONAL HEALTH WORD CLOUD

APPENDIX I

SOCIAL HEALTH WORD CLOUD

interaction comfortably economic meeting capable party someone time able greet peace smooth speak friends balance ability people times feel social calm crowd basis functioning state comfortable others office interact regular environment situations setting life surroundings public

APPENDIX J

PHYSICAL HEALTH WORD CLOUD

BIOGRAPHICAL SKETCH

Now age twenty-seven, April was born in Oshawa, Ontario, Canada, in the year of the bull, 1983. At the age of two, the McEwan family moved to three acres of grassy property neighbored with farms, evergreens, and a small community in Hillsboro, Ohio, providing April and her brother with a wonderful childhood of outdoor adventures. Saint Simons Island, Georgia, was home for nine years before she became a Georgia Bulldog in 2002, and graduated with a Bachelor of Fine Arts in Interior Design from the University of Georgia. She felt the need for change, further education and experience after working in Glynn County, Georgia for a few years. In the fall of 2009, she began her graduate career at Arizona State University as a Master of Science in Design candidate of the Herberger Institute Industrial Design program. Welcoming change and often flying by the seat of her pants, she welcomes life's many adventures as she shares her awesome experiences and understandings with others.