

THESIS

DESIGNING TO PROMOTE PHYSICAL HEALTH FOR THE OBESE IN  
COMMERCIAL INTERIORS

Submitted by

Andrea Roye Wade

Department of Design and Merchandising

In partial fulfillment of the requirements

For the Degree of Master of Science

Colorado State University

Fort Collins, Colorado

Fall 2011

Master's Committee

Advisor: Stephanie Clemons

Chad Gibbs  
James Banning

Copyright by Andrea Roye Wade 2011

All Rights Reserved

## ABSTRACT

### DESIGNING TO PROMOTE PHYSICAL HEALTH FOR THE OBESE IN COMMERCIAL INTERIORS

The purpose of this phenomenological study was to assess 1) interior designers' perceptions concerning the design of commercial workplace interiors that encourage and support physical activity, and 2) design strategies used to encourage employee physical activity within the workplace. This study was developed in part to determine perceived responsibility of the interior design profession toward the national obesity epidemic (i.e. HSW). This phenomenological study was conducted with practicing, commercial interior designers employed by large firms. Questions pertained to how participants perceive their role in 1) creating environments that impact obesity, and 2) developing design solutions to enhance physical activity in commercial interiors. The constant comparative method (CCM) was used for qualitative data analysis in the grounded theory approach.

Designers have been educated to develop efficient circulation patterns and adjacencies to enhance productivity; however, one consequence is a sedentary workplace that discourages physical activity. While momentum is gathering to encourage physical activity in community/urban planning, more needs to be done to encourage the same in interior spaces; particularly in workplaces that offer a setting for reaching large numbers of employees from varying socioeconomic and ethnic backgrounds.

## TABLE OF CONTENTS

Abstract.....	ii
Introduction.....	1
Justification.....	6
Definitions and Terms.....	7
Literature Review Search Process.....	8
Review of Literature.....	10
Overview of Obesity in the United States.....	10
Obesity: A Global and National Epidemic.....	10
National Obesity Statistics.....	12
Obesity and the Built Environment.....	15
Physical Activity and Built Environment.....	19
Work Environments and Obesity.....	20
Interior and Building Design that Support Physical Activity.....	27
Physical Activity Promotion through Interior Design.....	31
Ecological Model Related to Obesity and Physical Activity.....	36
Significance.....	39
Limitations.....	40
Purpose.....	40
Research Questions.....	40
Methodology.....	43
A Phenomenological Method.....	43
Procedures and Research Questions.....	45
Sampling Techniques.....	48
Data Analysis.....	49
Trustworthiness of Study.....	53
Findings.....	56
Context.....	56
Demographic Findings.....	58
Coding and Analysis.....	60
Themes: Perceptions and Motivations.....	63
Summary.....	77
Discussion.....	80
Implications.....	96
Conclusions and Future Areas of Research.....	97
References.....	133

## INTRODUCTION

In a world of 400 million obese and 1.6 billion overweight adults, interior designers, perhaps as much as nutritionists or doctors, have the opportunity to encourage physical activity and in turn, healthy lifestyles (Stone, 2008). Today, architectural and urban design too often support unhealthy rather than healthy diets, and sedentary rather than active daily lifestyles (Burney, Farley, Sadik-Khan, & Burden, 2010). Those responsible for the design and construction of residences, developments and supporting transportation infrastructure should be encouraged to provide more activity friendly environments (Transportation Research Board (TRB), 2005). This may hold true for those designing commercial interiors (e.g. offices) as well.

Characterized by environments that promote increased food intake, non-healthy foods and physical inactivity, America as a society has become obesogenic (Glanz & Sallis, 2009). Despite the health benefits of physical activity, 74% of United States (U.S.) adults do not get enough physical activity to meet public health recommendations and about one in four U.S. adults remain completely inactive during their leisure time (Ewing, Schmid, Killingsworth, Zlot & Raudenbush, 2003). Physical activity interventions are likely to have positive “side effects” for a range of health-related behaviors and conditions (King & Sallis, 2009).

Today, the physical layout of community environments has evolved toward a pattern of low-density sprawl, separation of land uses due to zoning, and settings

designed for and dominated by the automobile. The irony is that although much of urban planning policy is rooted in a concern for public health, the ultimate result has contributed to major contemporary health problems—inactivity and obesity (Wells, Ashdown, Davies, Cowett, & Yang, 2006).

As our nation moved from an agricultural model to a technology model physical activities to enhance our health and wellbeing were discouraged (Wells, et al., 2006). Although personal choice significantly impacts individual obesity, public health policies that invoke “passive” intervention are often more successful in achieving population-wide changes (Wells, et al., 2006). Therefore, various groups such as transportation planners, urban planners, and urban designers have been studying how to design cities so people would walk and cycle more (Sallis, Cervero, Ascher, Henderson, Kraft, & Kerr, 2006). Examples of passive approaches to promote physical activity include restricting downtown centers to foot or bicycle traffic, placing parking lots a suitable distance from buildings, making stairways more appealing and user friendly, planning new communities with businesses and schools built adjacent to residential areas and connected by a network of bicycling and walking paths, as well as public transportation (Mansi, et al., 2009). These multilevel interventions – based on targeting individuals, social environments, physical environments, and policies must be implemented to achieve population change (Sallis, et al., 2006).

While momentum is gathering to encourage physical activity in community planning, more needs to be done to encourage the same in interior spaces. Statistics indicate U.S. citizens spend more than 90% of their lives inside and this does not include the time in vehicles (Marrero, 2011). Americans also spend more hours at work than

persons in most other developed countries. For example, in 2001, American workers spent 1821 hours at work while German workers spent only 1467 (Mansi, et al., 2009). Therefore, the interior design of employment facilities are viable settings for reaching large numbers of working adults of varying socioeconomic levels and ethnic backgrounds. This opportunity transfers to the employers who have considerable control over the work environment and can easily make small but conscious decisions to change their employees' habits and behaviors (Kottke & Pronk, 2006).

Little is known about how the design of buildings or their site locations (e.g. lack of sidewalks, proximity to parks, access to food establishments), influence physical activity (Zimring, Joseph, Nicoll, & Tsepas, 2005). Yet, how we design and build our homes has changed dramatically over the past century (Dearry, 2004), with the incorporation of automated appliances, computers at home and design standards for efficiency (Dearry, 2004, Glanz & Sallis, 2009). Building construction practices during the past 100 years, along with a wide range of technological developments [that encourage sedentary activity] may have contributed to the obesity epidemic by enabling us to expend less energy to accomplish our work-related tasks (Wells, et al., 2006). Best stated by Winston Churchill, "We shape our buildings, and afterwards, our buildings shape us."

In addition, to changes in home design, office design has changed over the last 50 years. Conventional office planning and design has emerged in the form of functional-based guidelines to determine the appropriate environmental tools needed by employees to fulfill their roles (Chilton & Baldry, 1997). The United States General Services Administration suggests that designers use an open plan approach due to the higher

degree of efficiency and flexibility it provides (USGSA, 2010). These strategies were developed as workplace design solutions, to enhance productive performance, superior operational efficiency and reduced occupancy costs. The reduction of occupancy costs and improved utilization of space became a priority, which contributed directly to long-term financial success in a highly competitive market. However, a result of these efficiencies is a lack of employee physical activity. This has not gone unnoticed by employers. Many in the private commercial and public sectors have begun to implement policies providing economic incentives to employees for healthy weight-related lifestyle adoption/maintenance. These policies have included insurance premium discounts, subsidies for fitness activities and club memberships (Yancey, Pronk & Cole, 2007).

Reducing obesity and inactivity is a priority for employers seeking to lower the incidence and severity of chronic illness and the associated demand for health services (Heinen & Darling, 2009). The economic consequences of obesity and sedentary lifestyle for employers, business and government are staggering, both in health care costs incurred and in lost productivity, and are estimated to rival those of tobacco (Yancey, et al., 2007). Obesity and unhealthy lifestyle behaviors are increasingly being linked with productivity loss at work and sick leave, with more than 10% of sick leave attributed to obesity, which lead to elevated indirect costs. Productivity loss at work due to impaired health has an impact on future sick leave and on future general health. Primary interventions on lifestyle may have a noticeable contribution to maintaining a productive workforce (Robroek, J van den Berg, Plat, & Burdorf, 2011).

Again, health activities rarely occur simply with the provision of health facilities. Professionals, with limited time to devote to their health due to long work hours,



inevitably neglect their health. Employees often overlook the considerable impact of employer-sponsored wellness and health improvement programs. It has been proposed that employers can assist with this dilemma to ‘design in’ healthy behavior as part of the daily work routine. Policy development is needed to accelerate change, especially for smaller organizations (those with fewer than 500 employees), which represent the majority of U.S. employers and are far less likely to offer health promotion programs (Heinen & Darling, 2009). Workplace design has an impact on the success of a business; space standards have been established to create uniformity and efficiency (Chilton & Baldry, 1997; Wells, et al., 2006). The physical configuration of buildings reflects a bias toward human energy conservation—and against physical activity (Davis Langdon, 2010). Innovations have been aimed at making life easier by reducing our energy expenditure. We have strategically engineered physical activity out of our lives (Wells, et al., 2007).

Obesity is a complex condition, one with serious social and psychological dimensions, that affects virtually all age and socioeconomic groups and threatens to overwhelm both developed and developing countries (World Health Organization, 2004). Despite important advances, obesity remains one of the biggest public health challenges the country has ever faced, wide disparities remain among different racial and ethnic groups, and our response as a nation has yet to fully match the magnitude of the problem (World Health Organization, 2011).

How can the design of commercial interior spaces enhance nation-wide policies of passive intervention that can encourage physical activity of employees? Design and management tendencies have been developed to make the workplace more compact. This

does not encourage physical activity in the office place. Integrated sustainable design strategies are ultimately aimed to minimize movement by maximizing layout density and energy efficiency, and to promote flexibility in the working environment (Rassia, Hay, Beresford, & Baker, 2010). Space standards have been established to create uniformity and efficiency. Floor plan configuration, column spacing and structural layout are factors which affect space planning efficiency. Design of circulation paths can also have an impact; speed, quantity, arrangement of elevators & escalators, and their relationship with various spaces and floors are important design factors affecting efficiency (Chilton & Baldry, 1997). Space design efficiencies have reduced the amount of steps taken by employees and have enhanced worker's productivity. Office chairs are increasingly being designed to be comfortable and ergonomically sound, resulting in fewer calorie burning micro-movements (e.g., shifting or repositioning oneself in the chair) than decades ago. We spend much of our time at the computer. We send e-mails rather than stroll to a colleague's office, and we roll across the room rather than stand to retrieve a book (Wells, et al., 2007). Innovations have been aimed at making life easier by reducing our energy expenditure and increasing productivity in the workplace, but the result has been highly detrimental to the employee's health. How can interior designers assist in mitigating this problem through better design on interior commercial spaces?

#### Justification

Our challenge is to better understand the broad impact of our built environment on health and then design and build future environments and perhaps re-design existing environments that promote physical and mental health (Jackson, 2003). Public health has traditionally addressed the built environment to tackle specific health issues such as

sanitation, lead paint, workplace safety, fire codes, and access for persons with disabilities. It is time for a shift to built environments intentionally designed to facilitate physical and mental well-being (Jackson, 2003).

The interior design community is poised to take on one of the largest leadership roles in its history, as it works to ensure all of the research results regarding the built environment and physical activity are put into action with solutions (Stone, 2008). When designers are conscious of their decisions, especially the evidence linking design to health and behavior outcomes, the results are significant, be it on an urban scale or at home or in the office (Zimring, et al., 2005). As socially responsible interior designers, we need to be thinking of experiential ways to get the population moving (Stone, 2008)...literally.

#### Definition and Terms

- Obesity - is a medical condition in which excess body fat has accumulated to the extent that it may have an adverse effect on health, leading to reduced life expectancy and/or increased health problems (World Health Organization, [WHO], 2011).
- Overweight – is defined as abnormal or excessive fat accumulation that may impair health (WHO, 2011).
- Body Mass Index (BMI) – is a simple index of weight-for-height that is commonly used to classify overweight and obesity in adults. It is defined as a person's weight in kilograms divided by the square of his height in meters (kg/m<sup>2</sup>) (WHO, 2011).

- Physical Activity - is defined as any bodily movement produced by skeletal muscles that require energy expenditure (WHO, 2011).
- Built Environment - refers to the human-made surroundings that provide the setting for human activity, ranging in scale from personal shelter and buildings to neighborhoods and cities that can often include their supporting infrastructure, such as water supply or energy networks. The built environment is a material, spatial and cultural product of human labor that combines physical elements and energy in forms necessary for living, working and playing (Wikipedia, 2011).
- Space Planning - the analysis and design of spatial and occupancy requirements, including, but not limited to, space layouts and final planning (National Council for Interior Design Qualification, 2004).

#### Literature Review Search Process

The databases Academic Search Premiere and Business Source Premiere were used to locate existing research concerning the variables listed below. Google Scholar was the most successful source for the variety of articles needed for discussion. InformeDesign was also attempted, however no relevant articles were found beyond what had been obtained through Academic Search Premier and Business Source Premiere. Searches were performed based on the following words (individually and in various combinations):

- Obesity
- Physical Activity
- Interior Design

- Built Environment
- Work Environment
- Walking and Stairs
- Space Planning/Workplace Environment

Also, the indices of the *American Journal of Preventive Medicine* and the *Journal of the American Medical Association* were searched from 1998 – 2010 for relevant articles as well as the indices for the *Journal of Interior Design* and *The Journal of Architecture* were searched for the years between 1995 and 2009 for relevant articles. The websites for International Interior Design Association (IIDA) and American Society of Interior Designers (ASID) were also searched for popular press articles and relevant information. In addition to the databases and indices, several articles were found through other articles' reference lists.

## REVIEW OF LITERATURE

### Obesity in the United States

#### Overview

The purpose of this chapter was to explain the obesity epidemic in the United States (U.S.), how obesity can be impacted by the built environment and the relationship of the interior environment to obesity. In addition, the purpose of this study and research questions are indentified

#### Obesity: A Global and National epidemic

According to the World Health Organization (WHO), worldwide obesity has doubled since 1980 (WHO, 2011). Overweight and obesity are the fifth leading risk for global deaths, at least 2.8 million adults die each year as a result of being overweight or obese (World Health Organization, 2011). The U.S. is faced with an obesity epidemic, the U.S. Surgeon General, Institute of Medicine (IOM), and director of the Centers for Disease Control and Prevention (CDC) have made it a public health priority (Grantmakers in Health, 2007). “Nationally, two-thirds of adults and nearly one third of children and teens are currently obese or overweight. Since 1980, the number of obese adults has doubled. Since 1970, the number of obese children ages 6-11 has quadrupled, and the number of obese adolescents ages 12-19 has tripled (Levi, Segal, St. Laurent, Vinter, 2010, p. 3).” The United States has the highest rate of in individuals being overweight and obese in the world with our numbers at 74.1% in 2007 (Centers for Disease Control (CDC), 2010).

The WHO definitions state that a body mass index (BMI) greater than or equal to 25 is considered overweight and a BMI greater than or equal to 30 is considered obese (WHO, 2011). Causes of overweight and obesity in adults is an energy imbalance between calories consumed and calories expended (WHO, 2011). Globally there has been an increase in intake of energy dense foods that are high in fat, salt and sugar, but low in vitamins, minerals and other micronutrients (CDC, 2011). Changes in dietary and physical activity patterns are often the result of environmental and societal changes associated with development and lack of supportive policies in sectors such as health, agriculture, transport, urban planning, environment, food processing, distribution, marketing and education (WHO, 2011).

Of all age groups, childhood obesity is one of the most serious public health challenges of the 21st century. The problem is global and steadily affecting many low- and middle-income countries, particularly in urban settings. Globally, in 2010 the number of overweight children under the age of five is estimated to be over 42 million. Close to 35 million of these are living in developing countries (WHO, 2004). One in every three children in the U.S. (31.7%); ages 2-19 is classified as overweight or obese, that statistic equates to roughly 12 million children, of those children, about 70% will grow up to become obese adults (White House, 2010). Overweight and obese children are likely to stay obese into adulthood and more likely to develop non-communicable diseases like diabetes and cardiovascular diseases at a younger age. These related diseases are largely preventable; therefore the prevention of childhood obesity needs high priority (WHO, 2011). National data indicates that nearly one third of youth are insufficiently active, and more than half of all youth fall far short of recommended levels of vigorous activity

(Krizeck, Birnbaum, Levinson, 2004). Schools and communities should be encouraged to provide opportunities for healthy lifestyle choices in all childhood settings before, during and after school, as well as on weekends and holidays (White House, 2010).

While it is clear that, in order to prevent obesity and reverse the epidemic, people need to make healthy choices, it is also clear that people struggle with doing so. “The high rates of obesity in the United States are evidence that making healthy choices and managing one’s weight are difficult for many people because there are many barriers to healthy living in America” (Levi, et al, 2010, p. 4). One of these barriers is cost. “Healthy foods are often more expensive and scarce in many neighborhoods, while cheap processed foods are widely available” (Levi, et al., 2010, p. 6). These obstacles are often higher for people with lower incomes and less education, as well as for racial and ethnic minorities who often have more limited access to affordable foods and safe, accessible places to be active (White House, 2010). In addition, finding safe, accessible places to be physically active can be a challenge and the cost of going to a nearby fitness center does not fit into an individual’s or family budget. Individuals are more likely to engage in physical activity if it is provided for them in close proximity to where they live (Wilson, 2010). There is growing interest in how physical inactivity, obesity, and related chronic health problems are affected by environmental factors (Ewing, et al., 2003). Where you live, learn, work and play all have a major impact on the choices you are able to make (Levi, et al., 2010, p. 3).

#### National Obesity Statistics

Thirty-eight of the fifty states in the U.S. have adult obesity rates above 25%. 10 of the 11 states with the highest rates of obesity are in the South. See Figure 1. A very



recent statistic indicates that the number of states where obesity rates exceed 30% has doubled in the past year, 19.1% of people in Colorado are obese, the lowest rate of all states (Hendrick, 2011).

Adult obesity rates for African- American and Latinos are higher than obesity rates for whites in at least 40 states and the District of Columbia. High rates of obesity are associated with lower incomes, race, ethnicity, and less education (Levi, et al, 2010 p. 8). In 2009, black Americans were among the most likely to be obese, at a rate (36.2%), which is nearly 10 percentage points higher than the national average of 26.5%. The obesity rate among Hispanics is also higher than the nation's average, at 28.3%. Asians are significantly less likely to be obese than the general population, with 9.6% falling into the obese category (CDC, 2010). Examining obesity by age group reveals a distinct pattern. The rate among young Americans is 18.3%; it then increases among middle-aged groups, to 27.6% among 30- to 44-year-olds and 30.6% among 45- to 64-year-olds, before dropping off among seniors. Additionally, men are more likely than woman to be obese (Mendes, 2010).

Generally, although men may have higher rates of being overweight, women have higher rates of obesity. For both, obesity poses a major risk for serious diet-related noncommunicable diseases, including diabetes mellitus, cardiovascular disease, hypertension and stroke, and certain forms of cancer. Health consequences range from increased risk of premature death to serious chronic conditions that reduce the overall quality of life (WHO, 2004).

Again, being overweight or obese is largely preventable (CDC, 2011). Supportive environments and communities are fundamental in shaping people's choices, making the

healthier choice of foods and regular physical activity the easiest choice (WHO, 2011). Individual responsibility can only have its full effect where people have access to a healthy lifestyle. Therefore, at a societal level it is important to support all individuals with opportunities for regular physical activity and healthier dietary options (WHO, 2011). By establishing environmental and policy components in a community or work place, comprehensive intervention has the ability to affect every person living in the environment or jurisdiction affected by that policy. Effects should last as long as the person is in the environment or the policy is in effect (Glanz & Sallis, 2009). Prevention and modification of population obesity requires an understanding of the activities that comprise the current patterns of energy expenditure (Mansi, Mansi, Shaker & Banks, 2009). It has become clear that motivation to be active can be spoiled by a surprising array of environmental obstacles, increased computerization and mechanization of work, which can result in sedentary jobs. Creating more “activity-friendly” environments holds promise for improving population-wide physical activity in addition to enabling the long-term success of programs targeting individuals (King & Sallis, 2009).

In summary environmental factors, lifestyle preferences, and cultural environment play pivotal roles in the rising prevalence of obesity worldwide (Dehghan, Akhtar-Danesh, & Merchant, 2005, p. 5). Year-over-year comparisons find the percentage of Americans who are obese is on the rise, with more than a quarter of the adult population falling into this unhealthy weight group (Mendes, 2010). Although the effects of diet and physical activity on health often interact, particularly in relation to obesity, there are additional health benefits to be gained from physical activity that are independent of nutrition and diet, and there are significant nutritional risks that are unrelated to obesity.

Physical activity can have the fundamental means of improving the physical and mental health of individuals (WHO, 2004).

## Obesity and the Built Environment

### Built Environment

The built environment has been thought to play an important role in influencing obesity by creating a climate that promotes increased energy consumption and a reduction in energy expenditure (Wilson, 2010). Virtually everything in our built environment is the way it is because someone designed it that way (Jackson, 2003). The built environment consists of all man-made structures, including transportation infrastructure, schools, office buildings, housing and parks (Papavasiliou, Alberg, Ewing, Helzlsouer, Gary & Klassen, 2007). It also encompasses a range of physical and social elements that make up the structure of a community and may influence obesity. Aspects may include urban design factors, land use, and available public transportation for a region, as well as the available activity options for people within that space (Booth, Pinkston, & Poston, 2005).

The physical design of the places where people live and work affects their overall travel choices and how much they walk or bike for utilitarian travel (Frank, et al., 2004). Utilitarian travel is travel not for its own sake but, rather, to engage in activities at the trip end, such as going to work, shopping, or school (Ewing, et al., 2003). Researchers examining the relationship between the individual and environment should consider how the person's social attributes, including sex, age, family structure, and social roles (parent, worker, retiree, etc.) shape the person-environment interaction (Papavasiliou, et al, 2007).

Researchers should consider all varieties of the built environment to which humans are exposed across their lives. This includes consideration of both residential space and activity space, as well as the connection between these spheres (Papavas, et al, 2007). Parks and gardens serve as connection space and have long been noted for their restorative effects on both mental and physical health (Jackson, 2002). Other environments of interest might include work space, the travel environment between work, shopping, and personal business, and social and recreational activities. For example, the amount of time spent daily in commuting between home and work, as well as the quality of a person's daily commute, is drawing attention for its potential impact on health. Poor persons are thought to be more affected by their built environments because their activity spaces are smaller and they are more constrained by lack of transportation and opportunities for mobility (Papavas, et al, 2007).

However, the primary question facing researchers investigating the built environment and obesity is whether community design factors might prevent and/or discourage individuals from engaging in physical activity (Booth et al., 2005). The probability of being overweight or obese, and to a lesser extent of being physically active, is significantly associated with the overall urban form of the country in which a person lives (Frank, Anderson, & Schmid, 2004). The built environment can both facilitate and hinder physical activity and healthy eating (Booth, et al., 2005). Understanding the impact of the built environment on obesity may provide information necessary to develop successful community based prevention efforts.

## Land Use Mix

Land use mix is clearly one of the most important aspects of the built environment in relation to obesity. The average household with a land use mix had 18 non-residential destinations within a 1 kilometer area (Frank, et al., 2004). The odds of obesity declined by 12.2% for each quartile increase in mixed land use and 4.8% for each additional kilometer walked, but increased 6% for each hour spent in a car per day (Frank et al., 2004). Car time and walk distance are not the only aspects of the land use mix associated with obesity, access to food may also play an important role. Poorer areas of cities have fewer food establishments and grocery stores that provide healthy foods (Frank, et al., 2004). An understanding of the built environment-land use mix-obesity relation in different racial/ethnic groups may aid in the development of culturally specific community level obesity prevention programs in communities with high rates of obesity. The majority of research on the built environment-obesity relation has been conducted within non-Hispanic White populations in the United States (Papas, et al., 2007). Conflicting results were evident for the association between land-use mix and risk of obesity. Reasons for this conflicting evidence are unclear but may include differential effects of mixed land use on obesity risk within different racial/ethnic groups. More research is needed to further investigate the association between measures of the built environment, such as land-use mix, and obesity rates within different racial/ethnic groups (Papas, et al, 2007).

## Urban Sprawl

Studies on urban sprawl and public health have found that increased levels of sprawl are associated with increased obesity, decreased physical activity and poorer

health (Lopez and Hynes, 2006). Urban sprawl is considered to be any environment characterized by (1) a population widely dispersed in low-density residential development; (2) rigid separation of homes, shops, and workplaces; (3) a lack of distinct, thriving activity centers, such as strong downtowns or suburban town centers; and (4) a network of roads marked by large block size and poor access from one place to another (Ewing, et al., 2003). Within urban sprawl, certain features of the built environment – such as the presence of sidewalks, streetlights, interconnectivity of streets, population density and use mix – appear to encourage physical activity and thus reduce the risk of obesity and related health problems (Lopez & Hynes, 2006).

The common belief among new urbanists is that pedestrian- oriented urban environments have an intrinsic advantage when it comes to promoting physical activity (King, Stokols, Talen, Brassington & Killingsworth, 2002). Urban designs that utilize high density and mixed use areas have tendencies to increase pedestrian and bicycle activity (Jackson, 2002). Residents of walkable neighborhoods who have good access to recreation facilities are more likely to be physically active and less likely to be overweight or obese (Glanz & Sallis, 2009). Those living in sprawling counties are likely to walk less in their leisure time, weigh more, and have greater prevalence of hypertension than those living in more compact places (Ewing, et al., 2003).

The challenge is to understand the interrelationship between the built environment and human behavior and then to develop models that can predict the environmental conditions under which humans will be more physically active (Handy, Boarnet, Ewing, & Killingsworth, 2002). A combination of urban design, land use patterns, and

transportation systems that promotes walking and bicycling will help create active, healthier, and more livable communities (Handy, et al., 2002).

### Physical Activity and the Built Environment

Physical activity is a key determinant of energy expenditure, and thus is fundamental to energy balance and weight control. Physical activity reduces risk for cardiovascular diseases and diabetes and has substantial benefits for many conditions, not only those associated with obesity (WHO, 2004). Physical activity includes both structured and unstructured activities. ‘Structured activities,’ refer to supervised, regular and vigorous activities which are usually carried out in a facility. ‘Unstructured activities’ encompass a more broad description of lifestyle activities undertaken in different domains including domestic work and gardening, walking and cycling for transport or leisure, or work which incorporates physical activities (Gebel, et al., 2005).

Engaging in physical activity usually involves choosing exercise over a concurrent and powerfully competing sedentary behavior (Epstein & Roemmich, 2001). The choice of being physically active or sedentary can be influenced by the work necessary to participate or the environment one may be exposed too; but there also are large differences in the reinforcing value (motivation to participate) of physical activity (Epstein & Roemmich, 2001). Sedentary behavior, associated with obesity, is found in residences (filled with electronic entertainment and labor-saving devices), workplaces (sitting at a desk), sports venues (where the vast majority sits and watches others move around), schools, and roadways built to optimize travel by car (Glanz & Sallis, 2009). Those who are sedentary are more likely to be more responsive to lifestyle interventions that encourage the adoption of physical activity (Lawrence, Engelke, & Schmid, 2003).

The built environment can influence both physical and utilitarian activity.

Utilitarian exercise consists of those physical activities that are undertaken in order to accomplish another purpose, such as walking or bicycling to work (Frank, et al, 2003).

Physical activity environments are those designed to support daily activities, such as parks, sidewalks, trails, schools, workplaces, playgrounds, child care settings, and private recreation facilities (Glanz & Sallis, 2009). Physical activity could increase if environments were changed to increase the proximity and convenience of physical activity and that decreased access to sedentary activities could increase physical activity (Epstein & Roemmich, 2001). If accesses to both activities (physical or sedentary) are equal, people generally engage in the more reinforcing activity. If the reinforcing values of the activities are equal, people generally engage in the most accessible activity. In many situations, both the access to and the reinforcing value of the activities differ, and both factors are considered when making the decision to exercise or remain sedentary (Epstein & Roemmich, 2001).

Teaching the population about physical activity environments could produce a generation of advocates for healthy community environments (Glanz & Sallis, 2009). Although research on reducing sedentary behaviors suggests that this can help increase physical activity among some groups, a more direct approach is to make physical activity more reinforcing, so that regardless of the sedentary options, people will opt for more physical activity (Epstein & Roemmich, 2001).

#### Work Environments and Obesity

One hundred forty million persons aged 20 and older are currently employed in the U.S. Twenty-nine percent of them are obese, up from 20% a decade ago (Hertz &



McDonald, 2004). With obesity comes an increased rate of work limitation, along with significantly increased rates of hypertension, type 2 diabetes, the metabolic syndrome, and arthritis (Hertz & McDonald, 2004). Experts indicate that the workforce will be more diverse than ever, with multiple generations, cultures and ethnicities working side by side. Joyce Gioia predicts the variety will not stop there. “The workforce will be increasingly diverse in terms of not only old and young, but heavy/slim, sighted/not sighted and more people with disabilities,” she says (Bowles, 2008). According to NHIS study of American workers, obese men, and both overweight and obese women, regardless of age, were more likely to report limitations: 7% of obese workers have work limitations, versus 3% of normal-weight or overweight workers, 7% of obese women, 4% of overweight women, and 3% of normal-weight women have work limitations (Hertz & McDonald, 2004).

Worksites are extremely important settings for obesity prevention initiatives (Yancey, et al., 2007). Most Americans between eighteen and sixty-five spend a substantial portion of their days in the workplace or connected to it (Darling & Heinen, 2009). Worksites are viable settings for reaching large numbers of working adults of varying socioeconomic levels and ethnic backgrounds. Interventions to promote behavior change in such settings could be generalizable, cost-effective, and sustainable. If implemented, environmental interventions could have a major impact on the health of employees and, thus, on the health of the nation, as well as provide a positive return on corporate investments (Pratt, Lemon, Fernandez, Goetzl, Beresford, French, Stevens, Vogt & Webber, 2007).

The notion that synergy will occur when “supply” (physical environmental access and facilitation) meets “demand” (individual motivation and skills/interests) is implicit in multi-level change models. The importance of sociocultural environmental “demand creation” in physical activity promotion, however, has been even less appreciated than that of physical environmental change (Yancey, et al., 2007).

Given the large proportion of each day that most adults spend in work settings, and the potentially significant influences of workplace policies and culture on personal weight-related health behaviors, workplaces can play a vital role in promoting more active lifestyles and healthier eating practices that will assist in controlling the obesity epidemic (Yancey, et al., 2007). The increasingly sedentary nature of work and its impact on health and productivity indicators demands the promotion of physical activity at the worksite (Pronk & Kottke, 2009).

#### Promoting Physical Activity at Work

Most adults spend the vast majority of their day in buildings and on the sites immediately around buildings. This would appear to open up new opportunities for promoting physical activity (Zimring, 2005). The work place is one of the key settings for health promotion initiatives (Oldenburg, Sallis, Harris, & Owen, 2002). The benefits of physical activity are multifold, but we have strategically engineered physical activity out of our lives. Interior designers have supported this effort. For example, early research by Martha Van Rensselaer, founder of the College of Home Economics (now The College of Human Ecology) at Cornell University, was aimed at enabling housewives to “save steps” while completing daily chores. This research culminated in the development of guidelines that specify the optimal geometry between the stove, sink, and refrigerator.

This standard is known as the “Cornell kitchen triangle” (Wells, et al., 2007) and is still used today by professional kitchen and bath designers.

Employers have considerable control over the work environment and can easily make small but conscious decisions to change their employees’ habits and behaviors (Kottke & Pronk, 2006). To counteract the increasingly sedentary nature of work and its unintended consequences on health and productivity, corporations should consider how to integrate physical activity promotion into their overall business planning process (Kottke & Pronk, 2009). In choosing and managing facilities, employers should consider where they place parking spaces, how safe and attractive they make stairs, ways to build more physical activity into the workday, what stretching or other equipment is placed in break rooms, and whether space for showers and lockers are included—from the perspective of reducing obesity and improving physical activity (Darling & Heinen, 2009).

#### Economic effects of Obesity on Workplaces

Public and private employers can serve their own economic interests by addressing obesity. Policy development is needed to accelerate change, especially for smaller employers (those with fewer than 500 employees), which represent the majority of U.S. employers and are far less likely to offer health promotion programs (Darling & Heinen, 2009). Behavioral economists suggest that such “nudges” can be highly effective (Thaler & Sunstein 2008). However, they are not always appreciated or followed. The most recent National Worksite Health Promotion Survey results suggest a decline in offerings by employers with fewer than 750 employees between 1999 and 2004 (Linnan et al. 2008). The same survey reports that only 21 percent of this nationally representative

sample of employers offers weight management programs. Reported barriers included a lack of employee interest, lack of resources, and lack of management support. Because small businesses (fewer than 500 employees) employ 50 percent of the private-sector workforce, this survey provides an important, albeit sobering, perspective on the typical American worksite (Darling & Heinen, 2009).

Helen Darling and Luann Heinen have devised some suggestions for employers to provide impact opportunities for their employees and are as follows:

- Environmental support for healthy lifestyles, for example, open stairwells, walking paths, and signage marking distances and/or encouraging physical activity.
- Health-benefit design and incentives that encourage healthy behavior, reimbursement for consultations with a registered dietician, and cash or points as a reward for regular physical activity.
- Culture of health at work and activation of social networks to foster positive change using visible leadership participation.
- strong communications about health and wellness program offerings
- site, team, and/or individual competition to promote engagement
- health champions community and family connections to reach family members, including children, through employee education and targeted communications
- family and/or community access to company fitness facilities
- Corporate support of physical education in, for example, schools, playgrounds, and parks (Darling & Heinen, 2009).

This program was initiated in four major companies and has been in place for five years with successful measures noted. The example companies represent a range of industries: electric and natural gas utility, food manufacturing, health care delivery, and semiconductor technology. These programs were found to be effective in helping employees lose weight and maintain the loss in the short term (approximately six months) (Darling & Heinen, 2009).

The National Institutes of Health (NIH) have invested significant resources in understanding the effectiveness of worksite-based weight control programs, with seven randomized trials under way as part of the NHLBI Obesity Education Initiative (Pratt, Lemon, Fernandez, Goetzel, Beresford, French, Stevens, Vogt, & Webber, 2007). One study outlined by Pratt et al., uses an integrative model of worksite health promotion that emphasizes organizational and work environmental factors. This model, which is based on a systems perspective, argues that workplace health promotion efforts must address: 1. organizational factors (e.g., socio-cultural, economic), 2. work environment (e.g., physical and structural), and 3. job demands and worker characteristics. Thus, the intervention targets job demands and worker characteristics, physical work environment, and the socio-organizational environment. For example, in some worksites, specific job requirements or conditions limit or facilitate opportunities for physical movement. Thus, weight management strategies address these job demands in such worksites (Pratt, et al., 2007).

#### Employers Profit through Support of Obesity Prevention

Through the workplace, it is possible to influence the health behaviors of a significant proportion of employed adults and their families. Employers represent an

often overlooked opportunity for advancing workable solutions to combat obesity. Therefore, reducing obesity should be a priority for employers seeking to lower the incidence and severity of chronic illness and the associated demand for health services (Darling & Heinen, 2009). Technological advances continue to promote sedentary behavior at work and during leisure times (Epstein & Roemmich, 2001). Overall greater effect could be achieved by modest increases in the duration and intensity of everyday physical activities than could be gained by a large increase in the very small percent of time spent on leisure-time activities (Mansi, et al., 2009).

The economic consequences of obesity and sedentary lifestyle for employers, business, and government are staggering, both in health care costs incurred and in lost productivity, and are estimated to rival those of tobacco (Yancey, et al., 2007). The average total medical spending for a U.S. family of four was \$15,609 in 2008. See Figure 2. This average masks the varying costs associated with; for example, obese female employees, who have higher average medical expenditures of between \$1,071 (BMI 30 to 35) and \$1,549 (BMI 35 to 40) than do normal weight female employees. Twenty-seven percent of the growth of health spending between 1987 and 2001 was attributable to obesity, with a total cost of obesity to private employers at approximately \$45 billion per year, in 2002 dollars (Darling & Heinen, 2009).

Obesity and unhealthy lifestyle behaviors are increasingly being linked with productivity loss at work and sick leave, which lead to elevated indirect costs. More than 10% of the sick leave and higher levels of productivity loss at work can be attributed to obesity and unhealthy lifestyle behaviors (Robroek, et al., 2010). Obesity also generates indirect costs for employers by increasing workers' compensation claims and related lost

workdays, absenteeism, presenteeism (a self-reported measure of diminished on-the-job work performance due to health or life problems), and disability in people aged fifty to sixty-nine (Darling & Heinen, 2009).

It could be hypothesized that obese workers have longer sick leave durations and a higher level of productivity loss at work compared to workers with a healthy body weight and healthy lifestyle behaviors (Robroek, et al., 2010). Employers and employees clearly have a common interest in the affordability of health care and in addressing obesity as a key driver of health cost trends, disease prevalence, disability, lost productivity, and reduced length and quality of life (Darling & Heinen, 2009).

#### Interior and Building Design that Support Physical Activity

Although people spend most of their lives in buildings, there is surprisingly little study of building design and physical activity (Zimring, et al., 2005). Ecological frameworks postulate that health related behaviors are shaped by individual's interactions with their environment at several levels (Oldenburg, et al., 2002). While buildings and sites provide significant opportunities for increasing physical activity, they also represent difficult theoretical and methodological challenges, but pedestrian movement and activities within buildings can be affected by alterations that may require only a few months to achieve (Zimring, et al., 2005).

As individuals and groups use buildings on a daily basis, they are affected by the built-in physical aspects of the building and site (Zimring, et al., 2005). There is a need to make changes to the interior environment of the workplace. Environmental factors can be designs to make healthful behaviors the “default” option; an example would be open,

attractive central stairways (and less prominent, slow-moving elevators) (Darling & Heinen, 2009).

Exercise can be designed into the daily routine of employees; this could in principle be crafted into a worker's daily activity without any ongoing intervention on the part of the organization or indeed by any planned approach on the part of the employee. In this sense the activities could be seen as being 'embedded' into the work, by virtue of the design of the facility. An 'embedded' health environment is one in which the building coerces occupants into physical activity, as part of their everyday work routine (Finch, 2007).

#### Current Interior Design Strategies

Traditional office space standards, based on a salary/grade hierarchy, provided systematic parameters to determine space needs (Chilton & Baldry, 1997). From an organizational perspective, travel time is universally considered to be undesirable. Not only is it perceived as 'lost' time: it also is seen to hamper 'processes' that are seen to be affected by layout (Finch, 2007). An alternative approach to conventional office planning and design emerged in the form of functional-based guidelines to determine the appropriate environmental tools needed by employees to fulfill their roles. Space planning and circulation design strategies separate office function into various zones, to avoid disruption due to conflicting acoustic and functional requirements. For example adequately segregate noisy functions (e.g. common facilities, kitchen, and resource areas) from quieter non-related functions and locate work stations near co-workers (Rassia, et al., 2010). As the new ways of working were evaluated, the traditional rules of office planning and use expectations no longer produced satisfactory solutions.



A variety of workplace forms for commercial offices was derived from the application of integrated workplace strategies (IWS); a system that combines physical settings, information technology, nature of work patterns and processes, and the organizational culture and management (Chilton & Baldry, 1997). These strategies were developed as workplace design solutions, to enhance productive performance, superior operational efficiency and reduced occupancy costs. The reduction of occupancy costs and improved utilization of space became a priority that contributed directly to long-term financial success in the highly competitive business market (Rassia, et al., 2010).

#### Active Design Strategies

Through the use of “active design” techniques building design can increase regular physical activity. Active design is environmental design that encourages stair climbing, walking, bicycling, transit use, active recreation, and healthy eating (Burney, et al., 2010). People are more likely to make healthy behavior choices when these choices are easily available to them; and thus environments that support or discourage health behaviors critically influence health (Gebel, Bauman, Vita, Gill, Rigby, Capon, 2005). In modern buildings elevators and escalators are saliently located and inviting, whereas stairways are typically unattractive, inaccessible, and frequently hidden from entrances with small signs denoting their location, mainly in connection to fire exits (Mansi, et al., 2009). We seldom find contemporary buildings with wide, stately, inviting stairways gracefully winding from one floor to another (Wells, et al., 2006). Best practice solutions for stair use has been to provide them under the provisions of building codes, stairs are accessible to the public, but are typically in areas of the building that are less visible than elevators or escalators. The Americans with Disabilities Act (ADA) guidelines and

universal design strategies generally focus on elevator use as the primary means of vertical circulation (Burney, et al., 2010).

Stair climbing can be a low-cost and relatively accessible way to add everyday physical activity, but many building stairwells are inaccessible or unpleasant and elevators are far more convenient (Nicoll & Zimring, 2009). Stair use at work has the potential to increase physical activity and decrease obesity (Mansi, et al., 2009). According to Boutelle, et al.; buildings should be designed with attractive stairwells that are accessible to the general population. Their findings show that environmental changes can significantly increase the number of individuals in a building who use the stairs. Studies conducted at the Centers for Disease Control (CDC) documented that color, painting, and music can increase stair usage and several studies have documented the efficacy of motivational signs, banners, and point-of-decision prompts to encourage stair use. Another example, in a 2-year study in one of their own buildings in Atlanta, the CDC progressively improved the lighting, and added art, music, and color; they found persistent modest increases in use, all at a cost of \$16,000. The results of the CDC study led them to recommend improved stairs in all of their facilities worldwide (Zimring, et al., 2005).

It has been suggested that 2 minutes of additional stair climbing per day would result in weight reduction of <1.2 pounds per year, more than eliminating the 1-pound per year average weight gain by U.S. adults (Zimring, et al., 2005). By providing motivational signage, aesthetic improvements, or the spatial attributes of the location of stairs within the floor plan, such environmental interventions are showing increasing participation in voluntary stair use to be both attractive and routine in existing buildings.

While little research has measured actual walking behavior, environmental cognition research has suggested that the configuration of the physical environment can influence occupant behaviors, such as how occupants develop strategies to understand the layout of their environment and move through it (Zimring, 2003). Walking for exercise and recreation and walking for pleasure are likely highly correlated, as enjoyment is often a key attribute and purpose for choosing particular recreational activities (Owen, et al., 2004). Brisk walking has been identified as protective of physical health, independent of the benefits of more vigorous activity, particularly if it is done consistently (Saelens, Sallis, Frank, 2003). Increasing walking to about 2 kilometers per day is roughly equivalent to the public health goal of at least 30 minutes of moderate activity per day (Frank, et al., 2004).

The building's circulation system is comprised of the interior spaces, corridors, elevators, stairs, and lobbies that connect the programmed spaces of the building; therefore the circulation system provides opportunities for walking (Nicoll & Zimring, 2009). Efforts to increase the pedestrian orientation of the built environment through mixed use development, and good design, among other strategies, can enhance both the feasibility and the attractiveness of walking by reducing physical and psychological barriers. Even a small increase in walking would help to substantially improve the health and quality of life of most people (Handy, et al., 2002). Interior designers might collaborate with environmental psychologists, industrial designers, engineers, and architects, to explore how physical activity might be encouraged through design and technology within the workplace and to identify potential intervention strategies to encourage greater activity (Wells, et al., 2006).

## Physical Activity Promotion through Interior Design

Interior designers can have a direct and positive impact on public health and well-being by creating collaborative work environments that encourage constant movement. Interior designers can provide incentives for end-users to get up and move, one method that encourages physical activity in positive ways is to plan spaces to incorporate activity into your daily utility (Stone, 2008). A variety of methods can be utilized to change public awareness and promote behavioral changes. Even though widespread environmental changes may take years to show results, the beneficial effects can be expected to contribute to long lasting improvements in physical activity, eating, and obesity (Glanz & Sallis, 2009). Michael L. Goran, PhD., Professor at the University of Southern California's Keck School of Medicine and Director of USC's Childhood Obesity Research Center states "The need for interior designers to step up to the plate is great and immediate. Designers have a unique opportunity to address the obesity problem through identifying and creating aspects of the workplace, homes, schools and urban and community plans that promote a healthier lifestyle" (Stone, 2008).

Professionals, with busy working lives, working long hours, inevitably neglect health activities. The creation of 'embedded' health in buildings, giving way to an environment which coerces occupants into physical activity, as part of their everyday work routine, should be considered. The profession of interior design needs to carefully reexamine their assumptions in relation to space utilization and travel time. Is travel distance something that should always be minimized (Finch, 2007)?

The task of creating activity-friendly buildings may depend a great deal on the integration of environmental philosophies and features of the building's program. During

the programming stage of a project, the attributes and relationships between the specific spaces of the building are determined (Zimring, et al., 2005). While programming can be used to specify the preferred size and physical attributes of spaces that may promote physical activity, many activity friendly features of the environment may be in competition with higher prioritized values or needs such as functional and budgetary considerations, increasing the difficulty in incorporating them. The perceived or actual cost and benefit of activity-friendly features play a large role in whether they become part of the program (Zimring, et al., 2005). Furthermore, while activity-friendly programming may be compatible with some issues that are being actively promoted to the architectural industry, such as sustainability, it may be incompatible with other current issues such as the requirement for greater security and control within the building and site (Zimring, et al., 2005).

There are several strategies forming to incorporate physical activity into the work environment. Implicit in space planning systems widely used today is the belief that the necessity to travel (walk) is inherently bad. From an organizational perspective, travel time is universally considered to be undesirable. Not only is it perceived as 'lost' time: it also is seen to hamper 'processes' that are seen to be affected by layout (Finch, 2007). Exercise could be designed into the daily routine of employees, in this sense the activities could be seen as being 'embedded' into the work, by virtue of the design of the facility (Finch, 2007). Methods for implementation could be: vertical circulation paths between individuals and resources that necessitate walking and horizontal circulation paths between individuals and resources that necessitate stair climbing or descent (Finch, 2007). Larger corporations are now beginning to create campuses with the goal of

promoting physical activity. Such campus designs include intentionally significant distances between the parking areas and offices, longer treks between buildings, and greater distances to centralized conference and cafeteria facilities, as well as recreational walking trails (Wells, et al., 2006). Evidence supporting the economic and health impacts of employer sponsored health promotion and wellness is growing, although not as quickly as the experience base of large employers (Heinen & Darling, 2009).

A work-site wellness program supported by the American Health Association suggests that work sites should provide accessible indoor or outdoor exercise facilities and programming supporting the adoption of a physically active lifestyle. Examples include an indoor walking path with a mile distance marked off; lighted, attractive stairwells; provision of maps for safe and convenient walking outside the office; and free or markedly reduced access to exercise clubs (Carnethon, Whitsel, Franklin, Kris-Etherton, Milani, Pratt, & Wagner, 2009). Furthermore, the worksite should modify the physical and social environment to promote optimal cardiovascular health and wellness. Examples of physical modifications include improving workplace safety, modifying work stations and office layouts to decrease sedentary behavior, and encouraging physical activity (Carnethon, et al., 2009).

Innovative design interventions can help to incorporate physical activity into tasks that are typically sedentary. An interesting analogy is the “Dance, Dance, Revolution” video game that transforms stationary video game play into a fun, intense workout. One intriguing opportunity for research is offered by currently available computer technology that projects a laser image of a keyboard onto a flat surface such as a table or floor. The image can be projected quite large, potentially allowing individuals seeking alternatives

to sedentary typing, the option of “step typing”—similar to the stepping and dancing to play the piano keyboard in the movie *Big* (Wells, et al., 2006).

A concept that Brian Oldenburg and et al., developed, helps to determine if a workplace provides a healthy environment for the occupants; the Checklist of Health Promotion Environments at Worksites (CHEW) was designed as a direct observation instrument to assess characteristics of worksite environments that are known to influence health-related behaviors (Oldenburg, et al., 2002). The implementation of the program during the program planning phases of design can help designers assess the strengths and weaknesses of the environment for the promotion of health. The CHEW can be an objective and practical method for documenting by direct observation if a workplace environment promotes physical activity (Oldenburg, et al., 2002).

The State of California and the U.S. government have built office buildings where the main elevator banks will stop only on every third floor, and where able-bodied workers and visitors will be expected to walk up or down to their floor (Zimring, et al., 2005). The skip-stop elevators and stair design was envisioned as a means of organizing the high-rise building into a more human scale, increasing personal interaction and office cohesion among employees, and increasing physical activity while decreasing nonproductive time spent waiting for elevators (Nicoll & Zimring, 2009). During the 24-week period of the study, the open skip-stop stair was used 33 times more than the enclosed fire stair in the traditional vertical circulation core, upon occupancy in April 2005, initial attitudes toward the skip-stop design were evenly distributed with 32.4% expressing satisfaction, 32.1% neutral, and 35.4% expressing some degree of

dissatisfaction; 22 months after occupying the building, survey results indicated a positive shift in attitude toward the skip-stop arrangement (Nicoll & Zimring, 2009). Relatively little is known about how specific stairway design features might encourage stair use. Researchers have only begun to examine this question (Nicoll, et al., 2006). For example, further research is needed to determine how stairway width, steepness, or other design characteristics influence stairway usage.

Through creative, interdisciplinary collaboration and thoughtful research design, the field of interior design can make substantial contributions toward a healthier population. Spreading the word about the problem and what interior designers can do to solve it is crucial (Stone, 2008). “It’s all about education. We have to keep talking, giving information to the public, our clients and prospects, we have a huge responsibility” (Stone, 2008).

#### Ecological Model related to Obesity and Physical Activity

A social ecological perspective of health suggests that both social and environmental factors play an important role in increasing physical activity (Addy, Wilson, Kirtland, Ainsworth, Sharpe & Kimsey, 2004). In the past two decades, there has been a dramatic increased interest in, and application of, ecological models in research and practice. This is due in part to their promise for guiding comprehensive population wide approaches to changing behaviors that will reduce serious and prevalent health problems. Although ecological models have been used for decades in public health and the behavioral sciences, their influence has been modest. More recently, improved measurement methods, advances in multilevel analyses, the development of models



specific to each target behavior, and dedicated funding for environmental and policy research have enhanced the impact of ecological models (Sallis, et al., 2008).

A central lesson of ecological models is that behavior is influenced at multiple levels. Therefore, the most effective interventions should operate at multiple levels to create an environment that makes it easy to make the healthy choice (e.g., renovate the park), enhance social norms and social support (e.g., with a media campaign), educate and motivate individuals to take advantage of the opportunities for healthy behaviors, and use policy to reduce prices for healthy foods or to provide activity programs in parks (Sallis, et al., 2008).

Also, the use of behavioral theory may provide guidelines as to how we should anticipate that the environment will influence behaviors and ultimately rates of obesity. There is evidence that, in addition to measuring structural aspects of the built environment, measures of the social environment are also important influences on food consumption and activity (Papas, et al., 2007). Researchers need to consider all the many different built environments to which humans are exposed across their lives, for adults, environments of interest might include residential space and work space. Behavioral theory would suggest the need to consider both externally observable, objective influences and the interpretation of those attributes by working individuals, through measurement of subjective or perceived environmental traits (Papas, et al., 2007).

The ANGELO Framework (Analysis Grid for Environments Linked to Obesity), developed by Swinburn and colleagues, is a conceptual model for understanding the obesogenicity of environments and a practical tool for prioritizing environmental elements for research and intervention. Environmental changes may also be cost-effective

and have a more lasting effect on behavior change because they become incorporated into structures, systems, policies, and sociocultural norms (Swinburn, Egger & Raza, 1999).

Swinburn and colleagues developed an ecological model on which to base their framework. The model provides an understanding for obesity that incorporates environmental as well as biological and behavioral influences. See Figure 3. The biological and behavioral influences have attracted the most attention with respect to causes, treatment and prevention of obesity. Environmental changes may prove to be the most cost-effective and have a more lasting effect on behavior change because they become incorporated into structures, systems, policies, and sociocultural norms. Moreover, success at a population level is not likely to occur until environmental influences are identified and modified.

The development and execution of environmental intervention programs require the following steps: (1) needs analysis, (2) problem identification, (3) strategy development, (4) intervention, and (5) evaluation. The basic ANGELO framework is a 2 x 4 grid which dissects the environment into environmental size (micro and macro) by type: physical (what is available), economic (what are the costs), political (what are the “rules”), and sociocultural (what are the attitudes and beliefs). Within this grid, the elements which influence food intake and physical activity are characterized as obesogenic or “leptogenic” (promoting leanness). A leptogenic environment is one that promotes healthy food choices and encourages physical activity (Swinburn, et al, 1999).

The authors have categorized the different sectors of the environment as physical, economic, political, or sociocultural. Put in simple terms, these relate to what is available, what are the costs, what are the rules, and what are the attitudes and beliefs. A general

process has been developed to capitalize on the discipline that the framework imposes and the value of the rating process for prioritizing action. See Figure 4. The ANGELO framework appears most valuable at the needs analysis and problem identification/prioritization steps of planning health promotion interventions for reducing obesity at a population level. It provides a conceptual construct for dissecting obesogenic environments, a broad grid for brainstorming, and a process for getting stakeholders to prioritize future environmental interventions and research (Swinburn, et al, 1999).

#### Model for Study

The ANGELO framework (Swinburn, et al., 1999) will be used for this study to guide the participant questions when evaluating and reflecting on their role in creating environments that may impact obesity. The framework ideals can be utilized to ask the participants questions about their current behaviors, their attitudes toward the subject/issue and if they feel the topic is relevant to the current environments they design or any future projects. The process can also be used to ask questions about knowledge base and current skill level associated with the strategy for design that encourages physical activity.

#### Significance

There are several opportunities for research linking physical activity opportunities with design decisions at the building and site scale that can result in effective and relatively rapid obesity interventions (Zimring, et al., 2005).

Understanding environmental influences on physical activity is an important and challenging new area of population health research, with many new scientific opportunities. Importantly, it is research that is fundamental to chronic disease

prevention, through evidence- based environmental, transportation, urban planning, and public health policy strategies that will promote walking as a more central component of adults' health-enhancing physical activity (Owen, et al., 2004). If 95% of U.S. adults were smokers, it would rightly be considered a public health catastrophe, but a similar situation with physical activity is causing neither alarm nor appropriate action (King & Sallis, 2009). Just as design professionals are increasingly embracing green building as an objective, so too should they consider the potential effects of their designs on public health and wellbeing (Burney, et al., 2010). This research may be useful for educators, practitioners, and researchers w ho are interested in reducing the obesity epidemic in the nation and increase the physical health of employees.

#### Limitations

This was an exploratory and qualitative study and therefore cannot be generalizable to a larger national or international population. Additional work in this area of research would be needed before generalizable conclusions could be developed.

#### Purpose

The purpose of this qualitative, phenomenological study was to 1) assess interior designers' perceptions concerning the design of commercial workplace interiors that encourage and support physical activity and 2) assess if interior designers incorporate any strategies to encourage employee physical activity within the commercial workplace environment

The goal of this study was to identify themes or patterns as to whether interior designers readily practice the incorporation of physical activity encouragement into their

design. Undoubtedly we are only just beginning to wake up to the immensity of the obesity challenge in modern workplaces (Finch, 2007).

#### Research Questions

- What factors influence interior designer's decisions to design projects that incorporate physical activity and how are those factors influential in the final design solutions?
- Are there building environment policies that inhibit the inclusion of this strategy into the design process?
- Do current practicing interior designers feel this topic is relevant?
  - If yes, why?
  - If no, why?
- What factors determine the design criteria priorities of current practicing interior designers?
- What are the current attitudes, beliefs, perceptions and values of current practicing interior designers towards the incorporation of physical activity strategies into their design process?
- What do the current attitudes, beliefs, perceptions and values of current practicing interior designers have towards the incorporation of physical activity strategies into their design process?
  - Does this effect their decision to use the strategy?
- Does the age of employees have an impact on physical activity incorporation into commercial workplace interior?
- Does the region of the U.S. impact the incorporation of physical activity into commercial workplace interior environments?

- What strategies are practicing interior designers using to incorporate physical activity into their design, if any?
- If the designer is not incorporating strategies to encourage physical activity in the workplace, why not?
  - Do they believe this incorporation into their design is too expensive?
  - Do they feel they lack the information or training necessary to effectively design a building that encourages physical activity?
  - Do they or feel uncomfortable trying to convince clients to pay for a design solution they have never pursued themselves?
  - Are there other motivating factors behind some designers' decisions and, if so, what are they?

## METHODOLOGY

The purpose of this qualitative, phenomenological study was to 1) assess interior designers' perceptions concerning the design of commercial workplace interiors that encourage and support physical activity and 2) assess if interior designers incorporate any strategies to encourage employee physical activity within the commercial workplace environment. This chapter explained the research methods and model used for this study; as well the methods used to select participants, gather and code the data, and verify the trustworthiness of this study.

### A Phenomenological Method

The purpose of this study was to 1) assess interior designers' perceptions concerning the design of commercial workplace interiors that encourage and support physical activity and 2) assess whether interior designers incorporated any strategies to encourage employee physical activity within the commercial workplace environment and if so what strategies were used. This was an important study given the international and national obesity epidemic. As King and Sallis said, "creating more "activity-friendly" environments holds promise for improving population-wide physical activity" (King & Sallis, 2009) a multi-prong approach needs to be taken to address the obesity issue. Interior designers are a part of this group, through identifying and creating aspects of the workplace, they can promote a healthier lifestyle. There are real opportunities for linking research and implementation by creating awareness, developing a buy-in by decision

makers in the building process, enlisting organizations, especially within public building agencies, and developing programmatic support, tools, and measures to facilitate and evaluate activity-friendly buildings (Zimring, et al., 2005).

This phenomenological study allowed the researcher to develop an understanding (Creswell, 2009) based on the experiences and perceptions of several individuals who have lived experiences with this phenomenon.

Phenomenology, which has its roots in philosophy, was proposed by Edmund Husserl as a method of scientific inquiry into the concept of consciousness or of human experience and was originally used to study philosophy and theology (MacDonald, 2001). It is a strategy of inquiry in which the researcher identifies the essence of human experience about a phenomenon as described by participants (Creswell, 2009). In a phenomenological study, interviews are conducted in order to obtain an understanding of the meanings that participants attach to the phenomenon in question as the meanings and perceptions of participants are of concern in phenomenological research (Willis, 2007). A qualitative inquiry research method was appropriate for this study because the phenomenon to be explored, the perceptions toward designing commercial workplace interiors that encourage and support physical activity, is a process experienced by the participants. The purpose of a phenomenological study such as this is not only to describe the phenomenon in question, but to interpret the meanings behind it as well (Creswell, 2009). Phenomenology allows researchers to distinguish between individuals' perceptions of a reality and the reality itself (Willis, 2007).



## Procedures and Research Questions

### Participant Selections

In-depth interviews were conducted with eight interior designers selected from firms listed in the top one-hundred interior design firms from 2010. This list is annually published in *Interior Design* magazine. Eligible participants were current practicing commercial workplace designers and were selected based on their experience, and willingness to participate. Data collected from this set of interviews has created an understanding of some interior designers' perceptions of "physical activity encouraging design", as well as the motivations designers have for practicing this design strategy.

Due to demands on time, up to thirty individuals were invited via e-mail to participate in this study. A recruitment e-mail was sent to eligible participants from the researcher. In order to identify other potential participants, the investigator asked for suggestions from industry contacts that were assumed to be acquainted with commercial interior designers. Other potential interview participants were chosen through their affiliations with ASID, and/or IIDA. Several participants also suggested potential participants, who were contacted by the investigator, which allowed the researcher to also identify potential participants through snowballing. The researcher selected the first eight individuals to interview who responded to the request. Interested subjects were then contacted via telephone in order to discuss participation in the research and availability, as well as to allow the researcher to answer participant questions and address concerns regarding the study. Each prospective participant was assured of the anonymity of their answers and informed that participation is voluntary. For participants who agreed to take part in the study, an interview times were scheduled through a telephone call.

Individuals willing to participate received a short demographic survey (see Table 2) and a copy of the consent form via email prior to the scheduled interview date. The survey included questions regarding topics such as gender, age, type of employment, the number of years in practice, highest level of education achieved, practice experience in professional specialty areas (e.g. healthcare), length of time within their specialty, whether or not they have changed specialties during their career and professional affiliation with the International Interior Design Association (IIDA) or the American Society of Interior Designers (ASID). This information provided context for the data gathered during the in-depth interviews.

#### Model for Study

The ANGELO Framework (Analysis Grid for Environments Linked to Obesity), developed by Swinburn and colleagues, is a conceptual model for understanding the obesogenicity of environments and a practical tool for prioritizing environmental elements for research and intervention (Swinburn, et al., 1999). The ANGELO framework appears most valuable during the needs analysis and problem identification/prioritization steps of planning health promotion interventions for reducing obesity at a population level, which interior designers can utilize during their design process. The framework provided a high-quality approach for the interview process. This allowed the researcher to approach the research participants with an opportunity to evaluate and reflect their role in creating environments that effect obesity and encourage the participants to engage the strategy in their own designs, as well as see the potential for its effect on the workplace. The framework ideals were utilized to ask the participants

questions about their current behaviors, their attitudes toward the subject/issue and if they feel the topic are relevant to the current environments they design or any future projects.

### Interview Questions

Interviews conducted during any qualitative research inquiry are generally in-depth in nature, unstructured, and comprised primarily of open-ended questions designed to elicit the participants' opinion and views (Creswell, 2009). For this study, one to one and a half hour personal interviews were conducted over the phone. This procedure allowed the researcher to control the line of questioning and allowed each participant to provide in-depth, confidential information (Creswell, 2009).

Participants were asked a series of questions designed to uncover their perceptions about the need for physical activity within the workplace environment related to the obesity epidemic as well as their motivations for incorporating any strategies to combat such in their design process. See Table 3. The first set of questions addressed such topics as whether or not the participant has had exposure to “physical activity design incorporation” and, if so, what type of exposure has the participant had and when did that initial exposure take place. After this, participants were invited to respond to questions that relate to their work as a professional interior designer. Each of the questions gave context to the data regarding meanings and perceptions to the encouragement of physical activity within a commercial workplace environment.

The second set of questions was open-ended and was meant to obtain the designers' perceptions of designing to encourage physical activity within a commercial workplace environment. Participants were asked to relate their experiences with physical activity incorporation interior design practices. How often have the participants used this

design technique, if ever? What strategies they have used? Is the encouragement of physical activity important to them and, if so, why? Each participant was asked questions related to their opinions of physical activity encouragement design strategies, why they choose to pursue these design decisions or, if they do not pursue them, why not.

Participants were also asked about their perceptions of their ability to practice design that encourages physical activity. Questions regarding ability will include such topics as whether they feel they have proper training and information, the level of support they receive in their workplace, and client interest.

The last set of questions addressed the participants' future intentions toward incorporating physical activity encouragement within the workplace environment. Do they believe they will continue or begin to practice using the techniques they may incorporate? Why or why not? Do they believe this topic to become more or less important to their practice or their clients? What advantages and disadvantages do they see in physical activity encouragement design strategies, both for their clients and for their interior design business?

### Sampling Techniques

A small participant sample was purposefully selected for this qualitative and phenomenological study. Participants were selected intentionally for their ability to inform the central research questions being studied due to their personal experience with the phenomenon being researched (Creswell, 2009). In this study, one set of participants was selected. They were selected due to their experience with commercial interior design. Such focused sampling will ensure information rich cases that will result in a data set that can be analyzed to collect in-depth information and meanings. The intention of subject

selection within qualitative research is to select participants who are best suited to help the researcher form an understanding of the research questions (Creswell, 2009). In order to ensure the appropriateness of the participants, each participant was selected purposefully for his or her experience with the phenomenon being studied. Snowballing techniques were also utilized in order to select potential subjects for this study. Snowball sample selection allows researcher to identify appropriate participants regarding the phenomenon in question (Creswell, 2007). Data collected from these interviews will create an understanding concerning interior designers' perceptions of encouraging physical activity through design as well as the motivations they may have for strategies used in incorporating employee physical activity within the commercial workplace environment.

Care was taken to ensure the anonymity of each participant's responses. This will protect participants from possible professional repercussions should any answers be offensive to potential clients or employers. It is also hoped that anonymity and one-on-one interviews would ensure against social desirability bias. With the exception of the signed consent forms, no documentation created in this research contained participants' names. Also, questions asked in both the survey and interviews were designed to exclude identifying information, such as job titles or employer's names.

#### Data Analysis

This research is considered an exploratory study, as the intention is to find themes that could potentially be studied individually and in greater detail through both qualitative and quantitative research in the future. The motive of this study was primarily to understand the perceptions attached to the experience of "physical activity encouraging

design” as well as interior designers’ perceptions of physical activity within the commercial workplace. Therefore a phenomenological approach was used.

The researcher utilized the Constant Comparative Method (CCM) for qualitative data analysis in the Grounded Theory approach. Data collection is usually but not exclusively achieved through interviews. Themes relating to perceptions were coded using the constant comparative method for qualitative data analysis in the Grounded Theory approach. The phenomenological approach calls for inductive coding. One of the most helpful inductive methods is the use of constant comparative analysis (Miles & Huberman, 1994). Constant comparative analysis (Struass & Corbin, 1990) is an inductive process by which interview transcripts/documents are coded at and to capture the meaning of the statements and then these codes are used to induce categories (axial codes) that are more abstract and organize the initial set of codes.

Analysis of interview data in qualitative research tends to result in descriptions of an interpretivist view of the events, whereas CCM of data analysis involves searching out the concepts behind the actualities by looking for codes, then concepts and finally categories (Allan, 2003). During the analysis of an interview, the researcher became aware that the interviewee used words and phrases that highlight an issue of importance or interest to the research (Allan, 2003). Creswell suggests a linear, hierarchical approach for data analysis, utilizing a series of steps from specific to general (Creswell, 2009).

Steps and Methods for organization according to Creswell, (Creswell, 2009)

1. Organize and prepare the data for analysis
2. Read through all data

3. Begin detailed analysis with a coding process
4. Code data to generate a description of the setting or categories for analysis
5. Advance how the description and themes will be represented in the qualitative narrative
6. Make an interpretation of the themes

A fundamental part of the CCM is the derivation of codes, concepts and categories. CCM enables the generation of theory through systematic and explicit coding and analytic procedures (Glaser, 2004). The process involves three types of comparison. Incidents are compared to incidents to establish underlying uniformity and its varying conditions. The uniformity and the conditions become generated concepts and hypotheses. Then, concepts are compared to more incidents to generate new theoretical properties of the concept and more hypotheses (Glaser, 2004). Although this method is a continuous growth process-each stage after a time transforms itself into the next - previous stages remain in operation throughout the analysis and provide continuous development to the following stage until the analysis is terminated (Glaser, 1965).

The purpose is theoretical expansion, dissemination and verification of concepts, compression of concepts by developing their properties and generation of further concepts (Glaser, 2004). Comparison is also the dominant principle of the analysis process in other traditions of qualitative research. All types of aids, such as memo writing, close reading and rereading, coding, displays, data matrices and diagrams support the principle of comparison (Boeije, 2002).

Finally, concepts are compared to concepts. The purpose is to establish the best fit of many choices of concepts to a set of indicators, the conceptual levels between the

concepts that refer to the same set of indicators and the integration into hypotheses between the concepts, which becomes the theory. The CCM is designed to aid analysts with these abilities in generating a theory which is integrated, consistent, plausible, close to the data, and in form which is clear enough to be readily, if only partially, operationalized for testing in quantitative research (Glaser, 2004). The CCM is concerned with generating and plausibly suggesting (not provisionally testing) many properties and hypotheses about a general phenomenon, e.g., the distribution of services according to the social value of clients. The CCM does not require consideration of all available data, nor is the data restricted to one kind of clearly defined case. The constant comparative method may be applied for the same study to any kind of qualitative information, including interviews (Glaser, 1965).

The CCM can be described in four stages: (1) comparing incidents applicable to each category, (2) integrating categories and their properties, (3) delimiting the theory, and (4) writing the theory. From the Boeije, et al, 1999 empirical study a five-step analysis procedure was derived. However their suggestion is to use an amount of steps necessary for the current research the CCM is being applied towards; the available data will dictate the number of steps of comparison. For this study the researcher will plan to utilize three steps for comparison analysis (Boeije, 2002).

1. Comparison within a single interview.
2. Comparison between interviews within the same group.
3. Comparison of interviews from different groups.

Going about CCM in a purposeful way and reporting the researchers' own experiences when implementing the step by step approach, increases both the traceability



and credibility of researchers' analysis in their qualitative studies (Boeije, 1999).

Comparative thinking contributes to the development of criteria to distinguish categories of data, to the conceptualization of the field under study and to the patterning of the data that ultimately provides an answer to the research questions that are examined in a particular study (Boeije, 2002).

### Trustworthiness of the Study

The issues of validity and reliability will be addressed in numerous ways. The following techniques of verification will be included into the study in order to ensure the validity of this research.

#### Researcher's Perspective

The researcher acknowledges a bias towards the incorporation of physical activity design strategies into the practice of commercial interior design as a female, currently practicing commercial workplace interior designer. However the researcher did not wish to impose, directly or indirectly, her opinions onto her participants. The researcher also did not want to influence her participants to answer interview questions in a way that may be untrue. Some of the interviewees will be interior designers who practice the incorporation of physical activity encouraging design strategies therefore it is reasonable to assume that some the participants will have motivations similar to the researcher. There may be some who practice the incorporation of physical activity encouraging design strategies for other reasons, such as to satisfy clients wishes or because their employer directs them to do so.

It was the intention of the researcher to ask questions in such a way as to avoid intentionally leading subjects to answer "correctly", but honestly. Interview questions

were primarily open-ended to be able to understand the phenomenon of if and how commercial interior designers use strategies to encourage employee physical activity. It may be found from one interview to the next that there are questions that should be asked that the researcher had not originally considered. However, the researcher does not intend to use one set of answers to subtly direct another participant to answer in either a similar or different manner.

Most importantly, during the interviews, the researcher did discuss her own experiences, opinions, and motivations with participants, in order to avoid pressuring them to answer questions with the “right” answers. Also, due to the potential for social desirability bias, interviews were conducted with each subject individually. In accordance with the tradition of phenomenology, the researcher attempted to suspend judgment regarding the reality of the phenomenon and refrain from drawing conclusions can be founded on the certainty of data (Creswell, 2009).

#### Reflective Journal

The researcher maintained a reflective journal throughout the data collection and analysis process. A journal documented the researcher’s reaction to participant’s experiences and perceptions and includes the researcher’s questions and speculations, as well as emerging conclusions and interpretations (Creswell, 2007). This journal is a record of the researcher’s experience and thought process which will also help the peer review committee and other researchers to understand the study’s findings, as well as how the researcher arrived at the study’s conclusions (Willis, 2007). Additionally, contents of the journal can be used by the researcher and peers in order to cross-reference data analysis and interpretations (Creswell, 2007).

## Peer Review

The peer review process offered outside checking and assessment of the research process in order to ensure the researcher's honesty as well as to clarify methods and interpretations (Creswell, 2007). Peer reviews are standard in published scholarly articles. However, when incorporated into the research process, peer reviews offer suggestions regarding data collection and analysis methods and can be used as a sounding board for emerging interpretations and conclusions (Willis, 2007). The peer review process will also ensure that the study's findings resonate with readers (Creswell, 2009).

## Audit Trail

Reliability was achieved through the use of an audit trail that was maintained by the researcher throughout the research process. This trail consisted of a chronological account of all research activities, including interviews, transcription, coding of data, analysis procedures and interpretation of data (Creswell, 2009). The researcher's work was documented, and a record was kept of when ideas and interpretations began to form. Additionally, a record was kept of how these ideas were supported, and by what data, as well as how the ideas were expanded and refined (Creswell, 2007). The audit trail can be reviewed and evaluated by peers and other researchers in order to understand and/or verify the sources used to support the findings of this study.

## FINDINGS

The purpose of this qualitative, phenomenological study was to 1) assess interior designers' perceptions concerning the design of commercial workplace interiors that encourage and support physical activity and 2) assess if interior designers incorporate any strategies to encourage employee physical activity within the commercial workplace environment. This chapter will describe the findings that came from the participants' interviews, including an overview of the themes that emerged from their responses. Each participant is referred to by initials as to maintain confidentiality and anonymity.

### Context

A total of eight subjects participated in this research study. The phenomenon studied was the current practice methods of commercial workplace interior designers that encourage and support physical activity. Potential participants were therefore identified based on their lived experience with the practice of commercial interior design strategies. Participants were selected through purposeful sampling. The technique of purposeful sampling was selected in order to ensure that participants would be able to inform the central research questions due to their direct, personal experience with the phenomenon being researched (Creswell, 2007).

It was intended that all participants would be selected via the published list of the top one-hundred interior design firms from 2010, a list annually published in *Interior Design* magazine. Potential, eligible participants were selected from this list due to their current practice as commercial workplace designers and were also

selected based on their experience, and willingness to participate. Several contacted individuals who declined to participate in this study offered names of colleagues. Therefore the researcher utilized the snowball technique of sampling, a sub-set of purposeful sampling, which allowed the researcher to find participants who are known to others to be information-rich cases regarding the phenomenon in question (Creswell, 2007). Other potential interview participants were selected through their affiliations with the professional interior design organizations of ASID and/or IIDA.

Each potential participant was initially contacted through an email which included an explanation of the intended research, an invitation to participate as a subject in the research, and the investigators' contact information. Each potential participant who responded with a willingness to participate was selected as a participant. Each participant was sent a second that included an informed consent form, a short demographic survey, and instructions to contact the investigator with times and dates convenient to the participant for the purposes of scheduling an interview. Most interviews were scheduled via email though some participants preferred to contact the investigator by phone in order to schedule an interview time and location.

Each interview was conducted individually in order to prevent potential social desirability bias. Three of the eight interviews were conducted via phone conversations and the remaining five interviews were conducted via email. The five email interviews were conducted in this manner due to participant requests concerning time constraints in their busy schedules. Consent forms were signed by the participant and submitted to the investigator prior to the interview sessions. At the

time of the interview, participants returned completed demographic surveys to the investigator.

During all interviews, participants were asked a series of open-ended questions regarding their experiences, perceptions, opinions, and motivations regarding the practice of designing commercial workplace interiors that encourage and support physical activity. For email interviews, the investigator submitted the list of interview questions to the participant who then completed the interview and submitted their answers back electronically to the investigator.

A certain level of saturation was reached during the interview process as the majority of the interviews were conducted via email due to time restrictions in the busy schedules of committed participants. As it was unexpected that the researcher would have to conduct the majority of the interviews via email, the responses gained from this interview process were similar in content with all respondents claiming no education on the research subject of “physical activity encouraging design”, having little to no client interest and only limited use of the strategy. As the email responses came back nearly simultaneously, there was not an opportunity to see this saturation, and give the researcher an opportunity to restructure the questions to decrease the amount of saturation, therefore creating a limitation in the research.

#### Demographic Findings

All eight participants were current commercial interior design practitioners living and working in various cities across the United States. While the sample group was primarily female, three of the seven participants were male. See Figure 5. The participants represent a range of ages; two participants were in their late twenties; four

participants were in their mid to early thirties and two were in their fifties. All of the participants held a bachelor's degree in interior design from CIDA (formally known as FIDER) accredited schools, one participant held a master's degree. See Figure 6.

#### Employment/Years of Design Experience

The participants represented a wide range of employment opportunities and years of experience. Four participants were employed by large firms with one hundred or more people. One participant worked for a medium sized firm, which was defined for the purpose of this study as a company employing between twenty-five and ninety-nine individuals. Three were employed by small firms with one to twenty-four people. See Figure 7.

At the time of the interviews, most of the participants had spent their entire interior design careers within the same specialty area of design. The majority of participants in this study specialized in one or more areas of commercial design. Three participants focused on schools and other learning environments, one participant focused on hospitality and one participant focused on retail environments. Five participants focused on large-scale commercial projects, primarily office space along with healthcare or institutional spaces. See Figure 8.

The level of experience ranged from four years to thirty-two years of interior design practice. Five participants had ten or fewer years' experience and one had been working for eleven to thirteen years. The remaining two participants had been practicing interior designers for more than twenty-five years. See Figure 9.

## Certifications, Licensure, and Professional Accreditations

Seven participants had passed the NCIDQ. Three had become LEED Accredited Professionals (LEED AP) and another was a LEED Green Associates (LEED GA). The minimum level of experience among NCIDQ certified interior designers in this study was four years. One participant held the American Academy of Healthcare Interior Designers (AAHID) qualification. See Figure 10.

## Professional Affiliations

One participant was a member of American Society of Interior Designers (ASID) and five were members of the International Interior Design Association (IIDA). Two participants were not associated with any professional organization. See Figure 11.

## Coding and Analysis

Grounded Theory is the general framework that guided this research process. This phenomenological approach called for inductive coding. Data relating to participant perceptions were coded using the constant comparative method (CCM) for qualitative data analysis in the Grounded Theory approach. Responses regarding subjects' perceptions were arranged into open codes grouped by sentences or paragraphs, in order to determine specific motivating factors. The information was then associated into similar units to develop categories of the data. Once each interview had been open coded, further analysis of the codes took place to develop a summary concerning the core of the interview, find consensus in interpretation of any fragments and develop categories for understanding the responses. Using standard constant comparative method (CCM) analysis procedures, the similar codes were then compared in order to determine various common perception themes and a few outlier responses regarding participant perceptions.



The findings from the initial coding were arranged into axial coding to formulate criteria for comparing the interviews and hypothesizing about patterns and types which help to produce a typology. See Tables 4-11. This process enabled the researcher to develop broad explanations from the categories and their relationships. Concepts that emerged from the compared findings lead to more areas for comparison which generated new theoretical properties of the concept. There was notable overlap between the participants' responses, many answers that were worded one way by one participant and in other ways by other participants were determined to be similar enough to be considered the same concept. For instance, answers such as, "healthier employees equals better productivity," or "positive health work environments equal healthy employees" were coded under the item "Employee Health". The concepts that held similarities were then set into provisional codes (coding trees) which enabled the researcher to further determine what the core message of the interviews stated and allowed the researcher to analyze any fragments that may have occurred and determine how or if they were related. These findings were determined to be the resulting themes of the research. See Tables 12 and 13.

Most participants discussed several different ideas and concepts related to their motivations during their interviews, thereby providing answers capable of being coded into multiple provisional codes (code trees). Several participants answered in deep detail, thus providing answers capable of being coded into complicated, multi-branched 'trees'. Other participants spoke in a more direct manner. These sets of answers often resulted in more linear, less complicated trees. Once the provisional codes were analyzed, a set of

five items were identified, they were grouped by descriptions to determine if specific themes would emerge from the findings.

A further analysis of the participant's responses was conducted to determine, if any differences existed between the responses of the phone and email interviews, and if they could therefore emerge into additional themes. The responses gained from the phone interview were more detailed in length and personal views. The participants were more comfortable at expressing opinions where as the email interview answers were straight forward and more direct. The phone interviews also showed more emotion in their responses. Findings were then analyzed to determine if there were differences between male and female responses. The female answers did not differ from the male answers in either the email or phone interviews; there was a mixed reporting of perceptions from both genders with some responses from the female and male respondents having similar structure and content. The response between the two genders had no distinguishable differences, nor did the responses appear to have any gender bias.

The ANGELO framework provided a high-quality approach for the interview process and for analysis of the data. This framework allowed the researcher to approach the participants with an opportunity to evaluate and reflect their role in creating environments that encourage physical activity and encourage the participants to engage in utilizing this strategy in their own designs, as well as see the potential for its effect on the workplace. The framework ideals were also utilized to ask the participants questions about their current behaviors, their attitudes toward the subject/issue and if they feel that "physical activity encouraging design" strategies are relevant to the current environments they design or any future projects. Although the purpose of this study was not to analyze

the participants past or current work, it provided a framework the researcher could utilize to better understand how, why and why not participants were creating environments that encouraged physical activity. The themes of public health, obesity and gained education could most effectively be analyzed using the ANGELO framework. It was determined that a common motivation among the participants was the need to gain more education on “physical activity encouraging design” strategies. The participants felt they would be able to effectively create environments that could positively impact obesity and encourage physical activity, if they were properly educated and could therefore educate others. This realization provided an opportunity for the participants to evaluate and reflect their own role in creating these environments. Regarding the theme of public health, the participants responded that employee/occupant health was a major concern for them as well as their clients. By creating environments that promote healthy activity, the participants would be fulfilling their own desires and their clients. It was also apparent from the analysis that most of the participants could utilize the framework during project needs analysis and problem identification and therefore incorporate the physical activity encouraging strategy as a step of planning healthy environments.

#### Themes: Perceptions and Motivations

Five main themes emerged regarding participant’s perceptions for incorporating “physical activity encouraging” design strategies. There were also three main themes regarding participants’ motivations that will also be discussed. The five perception themes are education, with two sub-themes of lack of resources and limited knowledge, client interest, client attitude, current design methods and reasons for incorporating

strategy. The motivation themes are public/employee health, obesity and gained knowledge.

### Perception Themes

Several notable themes regarding experiences, perceptions, strategies, and hopes emerged from the interview data. The eight participants had mixed perceptions, some stronger than others, of their own abilities to make appropriate “physical activity encouraging” interior design decisions. More than half the participants’ felt little confidence in his or her abilities to effectively practice “physical activity encouraging” interior design, there were several different explanations given to support this perception.

Most participants’ explanations for the limited ability to practice “physical activity encouraging” design strategies were due to their lack of education or training, while other participants perceived their work experience to be the reason for their confidence in practicing “physical activity encouraging” interior design. The five main themes are education, client interest, client attitude, current design methods and reasons for incorporating strategy. The subthemes are limited knowledge and lack of resources.

#### Perception theme 1: Education

The need for education concerning the design of commercial spaces to encourage physical activity was the most frequently mentioned theme from the participants. Most of the participants felt they had insufficient training or exposure on how to incorporate “physical activity encouraging” design strategies. All eight participants mentioned that they had not received formal training regarding the subject of “physical activity encouraging” design strategies while in school or as professional development in the field. One designer mentioned that she had attended a continuing education course in

which they mentioned the concept but that it was not the topic being discussed at the course. Two major sub-themes emerged from the topic of education. The first was the limited knowledge provided to interior designers on how to incorporate physical activity design strategies into their practice and two was the lack of resources. Lack of exposure and a lack of education on the subject studied were mentioned by all respondents.

For example when asked the participants were asked if they felt they had proper education, training, or experience to effectively practice “physical activity encouraging” interior design strategies, LJ stated, “No, education is lacking. I have learned some techniques through job experience but there is not any offered via education.” KE stated that during school, “obesity was not that much of an issue as it is today. I think it could be something easily applied to the education we have already received from our accredited university through training; however, it was a never a priority during school projects.” EP states that “I feel that I have the training to ‘think outside the box’, yet in this specific design task, I do not have the experience or guidance to think this way. If educated on this topic, I feel that the ideas could be implemented into everyday design.” JD’s comment was “I have not received any formal training on how to effectively practice this strategy. The techniques we utilize are methods we have found to be successful from past projects. Education is greatly needed on the strategy; this would help to encourage other interior designers to start incorporating methods into their own designs.”

Seven of the eight participants felt it was necessary to receive education on the subject in order to be more successful at implementing the design strategy into their daily operations and design processes. CD stated that “I do not feel that I know enough about

physical activity encouraging design strategies to make many decisions about it. I have opinions and ideas about how to encourage physical activity, but I could be off-base in my thoughts. Since I have not had any education in this particular field I cannot say that I am qualified to make decisions regarding these strategies.” Most participants felt that the more education they had regarding “physical activity encouraging” design strategies the more they would incorporate the strategies into their daily practices as well as feel confident on the topic to suggest to and educate their clients on the strategy. CD felt that the more methods she learns about how to practice “physical activity encouraging” interior design, the more she will do it. CJ stated that as far as education was concerned “It would need to be encouraged by a health care provider, not an interior designer.”

#### Perception theme 2: Client interest

When the participants were asked what, if any support they felt they received in the pursuit of interior design strategies that encouraged physical activity -- either from employers/supervisors, colleagues/coworkers, or consultants -- six of the eight responded none. Most of the participants felt they did not receive any support for the pursuit of “physical activity encouraging design” from employers or supervisors, colleagues or clients. In addition, CJ stated that it was not a priority to her clients. CD mentioned that she feels that other designers might be interested in the strategy but since there is little encouragement or support for the strategy there is little incorporation into current projects. LJ stated that support came on a client/project basis, sustainability design strategies were more important to her firm and to her clients than physical activity design strategies. KE stated that she received minimal support from employers/supervisors, but as a designer she would need the most support from the client or tenant: person/company

who will occupy the space. Once the client/tenant is on board, then supervisors are usually on board, after a client request such as physical activity. However, she believes other colleagues and coworkers would be very supportive for PA within a work place. CJ stated she had no support. She had heard of huge companies like Apple or Google providing PA opportunities but it is not practical for small companies. As a designer, CJ states, “you would need to have a health conscious owner to request that you implement physical activity design strategies.”

The participants were then asked if they felt their clients were interested in interior design strategies that encouraged physical activity. Three of eight responses indicated that there was not any client interest. CD responded “I don’t think that my clients know to be interested in it. They may be receptive to it if it is brought to their attention, but they have not asked me or my company to incorporate it into my design.” MH stated that more often times than not the response was “no”, but rarely did the client resist their suggestions. KE stated that “Yes, I feel like they are adapting to the idea of PA more and more. After hearing studies of increased productivity, increased attendance to work, and healthier employees most clients are very excited about including it into the design of the space.” JD stated that in general he did not feel that his clients were not interested, but that they were primarily unaware how easily methods can be put in place within their spaces. He reported that he does not have many clients ask for it specifically.

### Perception theme 3: Client attitudes

Regarding company design and business productivity, the participants were asked if they had any regional or work culture differences that have encouraged or discouraged decisions to incorporate physical activity encouraging design. MH stated that he works

all over the country, and has had a considerably more difficult time with the central Midwest embracing wellness strategies than coastal metropolitan cities. He believes most of this is due to the age groups involved. For example, a major software company he worked with had the same type of office facility in Omaha as they do in Chicago, Denver, and Los Angeles; however, the average age in Omaha is 42 years old, while the average age in the other metro cities is 32 years old. He also noticed that the Omaha office was less enthusiastic about spending additional funds on providing health club facilities for their employees than the others. JD mentioned that he found differences in opinion and knowledge from the small Texas towns versus the larger Texas cities.

The smaller towns were more resistive to change or use of the strategy. CD said that many larger, corporate work cultures see a large office or work station as a status symbol. Employees want every convenience at their fingertips. She felt that if she were to encourage physical activity design strategies to her clients, many of them might be opposed if it meant that their large work area would be smaller or that they would be inconvenienced. Many of her clients think walking to the printer is a terrible injustice. The other participants stated they had not noticed any differences culturally or regionally. SC stated that “It is difficult to convince clients of the priority. Incorporating physical activity needs to be a philosophy that comes from the client, not just the design team.” She has had no client interest in the use of the design strategy, but feels that more interest would be shown if there was more public awareness over the subject. She stated “Just as there has been public awareness for LEED to encourage sustainability, there needs to be more for physical activity. It would help make it a priority in the design conversation. Most of the participants felt that their clients would hold a positive attitude toward the



design strategy if they were to implement it into a current project. CJ stated that her concern would be “if you as the designer designed a space and invested the clients’ dollars and it failed, the client would not be pleased.” LJ felt that the strategy could possibly add cost, but by creating unique design strategies, they should not have cost impact. “Stairs are already in buildings, so why not use them to your advantage.”

#### Perception theme 4: Current design methods

When the participants were asked to identify some of the physical activity encouraging strategies for the commercial work place they have used in their interior design projects, three of the eight admitted to never utilizing any strategy within their designs. Five of the eight participants incorporated some self discovered methods into their current projects, but they mostly felt they did not have proper education to fully support their initiatives. The designers have used such methods as monumental stairs for movement from floor to floor and circulation patterns that encourage more daily movement from employees. Other methods mentioned were the standing computer stations that encouraged individuals to get up and move from a seated position. Also mentioned were worksite exercise facilities.

LJ responded that she had utilized circulation patterns to encourage movement from employees. She also considered placement of individuals and their workstations for methods of encouraging movement as well as placement of team and individual spaces. She discussed how stair placement could encourage floor to floor movement in multi-story complexes. MH stated that “If the client is accepting, we will frequently locate ‘public’ spaces (e.g. break rooms, copy centers) within the interior space so that use of the stairwell is encouraged. This ‘activation’ provides the interior environment with a

sense of energy. CD utilizes the strategy by creating collaborative or shared spaces that encourage employees to leave their desk; shared copy or storage rooms that encourage employees to walk during the day. JD utilized secondary stair cases for encouraging movement between floors by incorporating more light from additional windows.

All the participants' interviewed felt there were few designated design strategies for implementing physical activity incorporation into projects. One of the participants, CD, stated that although she had incorporated some aspects of the strategy into her projects; that many times her projects were driven by space allocation or availability instead of physical activity. CJ mentioned that her company added a treadmill and bicycle to a car dealership for an overweight employee, but after a post occupancy evaluation they determined it was rarely used.

#### Perception Theme 5: Reasons for incorporating strategy

After analysis of the findings, various patterns and reasons emerged as to why the participants were incorporating "physical activity encouraging" design strategies. The findings became "reasons for incorporating strategies." As stated previously, seven of the eight participants desired more education on how to incorporate "physical activity encouraging" design strategies. They felt that with more education they would be more encouraged to suggest and therefore implement the design strategy into their current practice. Most of the participants were personally encouraged to utilize the "physical activity encouraging" design strategy within the majority of their projects. However, a lack of employer and design team support was considered a hindrance in their application by the majority of the participants. Though some of the participants readily suggested methods of incorporation, there was no interest or support from their colleagues. The

respondents further discussed that their supervisors and clients also lacked resources and education. Which is a concerning indication that the general population is mostly unaware of the impact obesity is having on our nation and that it has reached epidemic levels. SC states that “It is difficult to convince clients of the priority. Incorporating physical activity needs to be a philosophy that comes from the client, not just the design team.” She has not had any client interest in the use of the design strategy, but feels that more interest would be shown if there was more public awareness over the subject; “Just as there has been public awareness for LEED to encourage sustainability, there needs to be more for physical activity. It would help to make it a priority in design conversation with clients.” SC noted that “physical activity is important due to our more sedentary lifestyles. The work place should include the opportunity, but not force employees to take advantage of a more active lifestyle.” Four of the eight participants gave strong opinions regarding the need for physical activity within the workplace. MH stated with assertion that he feels it to be imperative to encourage physical activity in design strategies and KE stated that incorporating physical activity is an extremely important design strategy, while CJ stated that the incorporation of physical activity incorporation into a work facility is only important for senior living and healthcare. Overall the participant’s attitude towards the incorporation of physical activity encouraging design strategies into their current practice was positive. Only one participant stated that these strategies should be encouraged by health care providers not a designer.

#### Motivation Themes

Responses regarding participant’s motivations were coded in order to determine specific motivating factors. The codes were compared in order to determine various

common motivation themes and a few outlier responses regarding motivations. These items were then grouped into three motivation themes, public/employee health, obesity and gained knowledge

#### Motivation theme 1: Public/employee health

The health of employees within commercial workplace interiors theme related to the motivation for incorporating physical activity into the design practices of the individuals who were interviewed. All eight participants mentioned aspects of health, whether discussing the health of the building occupants, health of the public or personal health. Related concepts such as happiness, well being, and quality of life were also discussed by three participants. “Healthy environments” was mentioned in five of the open code analysis activities. “Healthy employees” was also included in seven of the open code analysis activities. In two of those analyses, “public health” was repeated numerous times within the interview process. In total, the general theme of health was mentioned in six of the eight open codes analysis of the interviews, representing six participants’ motivations. It was generally believed by most participants that the use of physical activity incorporating design strategies could result in interior environments that had fewer negative impacts on occupant health, thus allowing occupants to feel healthier, and be more productive in their environment. One respondent stated that “as a firm, we view wellness as a benefit of design and it frequently becomes a topic of conversation in schematic design, programming, and in house charettes.”

Most of the participants suggested that public awareness of the subject may lead to more desire to implement the strategy, but they did not feel they had the education to provide such information. Some felt the information needed to come from another source,

such as a healthcare provider. Lack of employer and design team support was also mentioned by the majority of the participants. Even though some of the participants readily suggested methods of incorporation, there was no interest or support from their colleagues. Most of the participants suggested that public awareness of the subject may lead to more desire to implement the strategy, but they did not feel they had the education to provide such information. Some felt the information needed to come from another source, such as a healthcare provider. Four of the eight participants gave strong opinions regarding the need for physical activity within the workplace. MH stated with assertion that he feels it to be imperative to encourage physical activity (PA) in design strategy and KE stated that incorporating physical activity is an extremely important design strategy, while CJ stated that the incorporation of physical activity into a work facility is only important for senior living and healthcare. MH, one of the participants who has practiced commercial interior design for thirteen years, stated that “I believe physical activity promotes an ‘active’ work environment that not only helps promote positive health but also encourages collaboration among employees; collaboration encourages the exchange of ideas. This spontaneous collaboration is a good example of how good design is good business.” He believes that interior designers can make a considerable impact on the health and welfare of employees. EP stated that encouraging physical activity within a work environment was important because we live in an environment where it is encouraged to sit at your desk, work long hours in a static position, in order to get a little more work done.

## Motivation theme 2: Obesity

The majority of the participants interviewed for this study perceived obesity as a national issue and that the incorporation of “physical activity encouraging” design strategies to be one method for the prevention of obesity. As stated by CD, “It never seemed to be an important issue to me until I worked on a project in which so many employees that were obese, I started to think about the need for design strategies to encourage physical activity. I try to incorporate it in all of my projects to a degree.” JD, a health care designer for more than twenty years, commented that physical activity encouragement is “extremely important.” Obesity is an alarming issue in our country and interior designers can make a difference for the public by how we design and structure our buildings.” SC stated that “obesity and physical unfitness are major issues facing the American population.” She further claimed that “healthier employees are happier and more productive.” She feels this will be the main advantage to cause a paradigm shift in corporate philosophies, that start activity encourage more physical activity in the workplace.

## Motivation theme 3: Gained knowledge

The study included a set of questions to assess the participant’s motivations toward “physical activity encouraging” design strategies. When asked if they would continue to practice physical activity encouraging interior design strategies in the future, six of the eight participants said “yes” they had plans to continue their current efforts. Two of the eight said they would only utilize the strategy if they were asked by clients to do so. They would not actively pursue the use of the strategy as they felt it did not pertain to their current practice. Seven of the eight participants desired more education on the topic and

felt that would encourage them to be more proactive in the use of the design strategy. Seven of the eight expect encouraging physical activity in the commercial work place to become more important to their practice and to their clients in the future. CJ stated that she had already seen an increase in her client requests as well as it becoming a more frequent suggestion from her firm to their clients. CJ felt that the encouragement of physical activity within the workplace might relate to liability issues. She felt she needed to further investigate any such liabilities toward herself and her clients. Participant perceptions were assessed concerning the advantages they perceived when pursuing physical activity encouraging design strategies, for both clients and their business.

All of the participants stated that healthier employees would be the most obvious advantage. KE said that she perceived the main advantages would be the success of having active and energized employees within a space that functions and works well for them. A satisfied client refers your services, which would be great marketing. JD stated that there are no real disadvantages to the use of the strategy, only lack of education for designers and the public. Six of the eight participants' saw no disadvantages to the utilization of the design strategy. Instead they felt the design strategy is but a new way of thinking and that some individuals are reluctant to change or that some corporate cultures may have difficulty accepting the new way of thinking.

At the end of each interview the researcher gave each participant the opportunity to provide any additional comments regarding physical activity encouraging design strategies. CJ stated that the concept is "inspirational, the strategy should be implemented in a way that is mindless, it just happens as part of a designer's design process." She felt the strategy should eventually be dictated by code. KE stated that "This is something that

I hope to continue to research and see take effect in many aspects of designing spaces especially in the corporate world. I look forward to reading and seeing more articles, training and continuing education classes on the subject.” MH felt that he “believes LEED certification has also played a significant role in encouraging businesses to provide wellness programs and facilities for their employees (e.g. locker rooms, access to health clubs, bike racks).” And EP stated that “I feel that this is an important topic, but the client would need to be there. ‘Green’ design has been around for quite a while, yet it is only now beginning to become accepted. I feel the same would be true for physical activity design.” Another participant stated that although she had recently changed jobs and was no longer designing commercial interior projects, she felt that incorporating physical activity into current design strategies is a great idea and would be beneficial to the employees and employer. “The employees would be more energized, excited, and think more clearly while at work. I think it is very important in the corporate world this day in time.”

The participants all felt that any negative attitude towards the design strategy would be from lack of interest from either supervisors or clients. EP stated that “It is new way of thinking, which means that clients will not necessarily buy into it.” CJ had the opinion that “today’s employees want benefits that benefit their lifestyles: day care on premises, flex hours, a nice working environment, healthcare and dental provisions, not necessarily being physically active while at work.” JD stated that he has great support from his firm; however there is more support towards sustainable initiatives. His firm has some resistance from their clients until they inform them there is little to no cost difference and explains the added health benefits for their employees.



## Summary

The participants in this study expressed five main perceptions and 3 main motivations regarding the incorporation of “physical activity encouraging” design strategies into their everyday practice. While there were a few outlying responses, such as the implementation of health initiatives should be left to healthcare providers, not interior designers. There was overall a great deal of consensus among the responses. Most of the participants believe that public health and the incorporation of physical activity into daily routines is important. They generally felt that “physical activity encouraging” interior design will continue to grow in the future. A summary of the participants’ comments is provided in Figure 12, see appendix.

While the educational experiences varied among the participants, each participant perceived education, either formal or on the job, to be an important factor in their ability to practice “physical activity encouraging” interior design strategies. Additionally, most of the participants perceived their own ability to effectively pursue “physical activity encouraging” strategies to be strong. Different strategies were discussed by the participants, though most mentioned that they had usually tried to utilize existing design features such as stairs and circulation patterns to incorporate the encouragement of physical activity. Two of the designers interviewed had implemented strategies to encourage floor to floor movement within their projects by centralizing shared work spaces and break rooms next to central stairs, thus encouraging stair use. Personnel placement and the utilization of central copy and printer rooms was a strategy utilized frequently by one participant. And while the level of personal commitment to utilizing

this design strategy appeared to vary among the participants almost every participant mentioned some aspect of personal responsibility during their interview.

All of the participants were asked to share their thoughts on the future of incorporating physical activity within interior design. Many believed that “physical activity encouraging” design would continue to grow, or become “part of our practice.” Most participants also mentioned their perceptions of the direction of “physical activity encouraging” design within interior design or their hopes for the future of “physical activity encouraging” design in response to several previous questions as well. The majority of participants held the perception that “physical activity encouraging” interior design strategies would become more prevalent within the industry in the future. Four participants expressed the hope that it would one day become standard practice. None of the participants in this sample considered “physical activity encouraging” design to be a fad or something that would one day become less common than it is now, only that the topic was very new and unrealized amongst the design community as well as the with clients.

Surprisingly, out of the eight individuals interviewed, only two participants commented on the interior design professions responsibility towards the incorporation of the “physical activity encouraging” design strategy. These statements were opposing in viewpoint. MH stated that “Physical activity encouragement should be a requirement within the design of commercial buildings.” SC commented that her overall opinion towards “physical activity encouraging” design strategies was positive, it should not be mandated.

In general, there was a great deal of agreement among the participants on many topics, despite the differences in their experiences. There were many common perceptions and motivations, which resulted in the emergence of several themes such as improved health among building occupants and their pursuit of education on implementing the design strategy.

## DISCUSSION

The purpose of this study was to 1) assess interior designers' perceptions concerning the design of commercial workplace interiors that encourage and support physical activity and 2) assess if interior designers incorporate any strategies to encourage employee physical activity within the commercial workplace environment. Various themes emerged from this study that support the current body of knowledge related to obesity. However, the review of literature did not reveal any existing research regarding the perceptions or motivations practicing interior designers have of "physical activity encouraging" design strategies.

Both motivation and perception themes will be discussed in this chapter in the context of existing literature. In addition, after the conclusion, several future areas of research will be discussed. The findings regarding these themes are briefly below. For more detail, please see the Findings section.

### Perception themes

Currently, no research exists regarding the perceptions practicing interior designers have of "physical activity encouraging" design strategies. The purpose of this study was to create an understanding of what perceptions interior designers may have regarding "physical activity encouraging" interior design strategies. The findings regarding these perceptions and their subthemes are discussed below.

## Perception theme 1: Education

Through the interview process, it emerged that there was little to no education provided to interior designers, whether in school or after graduation through continued education credits, regarding the incorporation of “physical activity encouraging” design strategies. Teaching the population about physical activity environments could produce a generation of advocates for healthy community environments (e.g. Glanz & Sallis, 2009). The interior design community is poised to take on one of the largest leadership roles in its history, as it works to ensure that research results regarding the built environment and physical activity are put into action with solutions (e.g. Stone, 2008). According to the results of this study, only one of the eight participants had been exposed to any education on the subject of physical activity encouraging design strategies. Education is key to the success of improving the health of our nation, interior designers have to keep talking, giving information to the public, their clients and prospects (e.g. Stone, 2008). Interior designers have the opportunity to provide public education to their clients about the necessity of physical activity incorporation. With proper education for themselves on the subject of “physical activity encouraging design strategies”, they will be able to effectively communicate the necessity to their present and future clients. With proper education and exposure on the existing issue of lack of physical activity employers offer an opportunity for advancing workable solutions to combat obesity (e.g. Darling & Heinen, 2009). There is little to no education at the college level for “physical activity encouraging” design strategies, evident by the responses of all eight participants stating they had not received any training or education while in school. Not unlike sustainability,

teaching “physical activity encouraging” strategies while in school will give early exposure to students, within the context of a formal education, and is integral to the growth of a sense of personal responsibility toward encouraging physical health to the public by means of building design (e.g. Zimring, et al, 2005).

#### Perception theme 2: Client interest

The designers interviewed for this study indicated little to no client interest or encouragement to incorporate design strategies that encourage physical activity. If designers have little education on a design strategy, rarely do the clients have more. Buildings and sites are deliberately designed to support a set of activities and to create or reinforce a set of cultural assumptions. It has been proposed that employers can assist with this dilemma to ‘design in’ healthy behavior as part of the daily work routine. Policy development is needed to accelerate change, especially for smaller organizations (those with fewer than 500 employees), which represent the majority of U.S. employers and are far less likely to offer health promotion programs (Heinen & Darling, 2009). Worksites are extremely important settings for obesity prevention initiatives (e.g. Yancey, et al., 2007). Research has shown that employers have considerable control over the work environment and can easily make small but conscious decisions to change their employees’ habits and behaviors (e.g. Kottke & Pronk, 2006). The perceived or actual cost and benefit of activity-friendly features play a large role in whether they become part of the program (Zimring, et al., 2005). Three of the eight participants mentioned project costs and clients perceptions toward cost increase if “physical activity encouraging” design strategies are incorporated. While programming can be used to specify the preferred size and physical attributes of spaces that may promote physical activity, many

activity friendly features of the environment may be in competition with higher prioritized values or needs such as functional and budgetary considerations, increasing the difficulty in incorporating them. There is no current research on the subject of cost increases related to “physical activity encouraging” design strategies; however the designers interviewed felt there should be no cost increase if existing program requirements such as circulation patterns and stair cases were utilized for the encouragement of physical activity. A few of the participants stated that their client’s only objection was cost driven until they were informed the design strategy could be implemented with little to not cost additions. Many clients were encouraged by the health benefits their employees could gain as well as the possible reduction in health benefits costs due to healthier employees.

#### Perception theme 3: Client attitude

Most participants expressed concern for their clients’ goals during their interviews. They also discussed their motivations for pursuing “physical activity encouraging” design strategies in order to achieve various client goals, independently of their motivations for pursuing their personal goals. The suggestion that client concerns may drive some interior designers toward physical activity encouraging design is supported by the findings of this study. In addition to expressing a sense of personal responsibility for practicing “physical activity encouraging” design strategies, several participants in this study expressed a willingness to practice the design strategies whether or not clients and coworkers supported their efforts to do so. Several participants expressed their intentions to provide clients with “physical activity encouraging” design solutions, even if the client had not requested them.

Overall, the participants in this study held the perception that the practice of “physical activity encouraging” design strategies would lead to a better future for the individuals within workplace environments. Participants in this study took initiative for pursuing “physical activity encouraging” design strategies on their own because they felt a personal responsibility to do so, often without the direction of clients or colleagues. There are real opportunities for linking research and implementation by creating awareness, developing a buy-in by decision makers in the building process, enlisting organizations, especially within public building agencies, and developing programmatic support, tools, and measures to facilitate and evaluate activity-friendly buildings (e.g. Zimring, et al, 2005).

#### Perception theme 4: Current design methods

Designers have been trained in school as well as in practice to use an open plan design approach due to the higher degree of efficiency and flexibility it provides in the workplace (e.g. USGSA, 2010). From an organizational perspective, travel time from point A to point B is universally considered to be undesirable. Not only is it perceived as ‘lost’ time: it also is seen to hamper ‘processes’ affected by layout (Finch, 2007). Space planning and circulation design strategies were created to separate office function into various zones to avoid disruption due to conflicting acoustic and functional requirements. These strategies were developed as workplace design solutions to enhance productive performance, superior operational efficiency and reduced occupancy costs. As a result of these efficiencies discourage employee physical activity (e.g. Yancey, Pronk & Cole, 2007). As there are very limited examples of activity-friendly buildings for architects and



designers to assess or emulate, the development of activity-friendly design practices has received minimal attention in both research and practice (e.g. Zimring, et al, 2005).

However, there is a greater need for re-educating the design community on efforts for the inclusion of physical activity into the workplace environment. Missing from the perceptions of the participants is the need for distinction between instrumental activities and hybrid activities, although subtle, it is an important one. Recreational, instrumental, and hybrid activities emphasize different facilities. Encouraging recreational activities focuses on providing access to indoor and outdoor facilities such as exercise rooms and walking or bike paths. On the other hand, promoting instrumental and hybrid activities requires an understanding of the relationship between layout, design, and everyday life (e.g. Zimring, et al, 2005). Therefore, without proper education for methods of application, current designers are left with limited options for the incorporation of “physical activity encouraging” design strategies.

With all respondents from this study claiming on some level they have received no formal training on the methods of incorporating “physical activity encouraging” design, the need is now. Based on findings from this study, former space planning and circulation design strategies taught in school need revision to include “physical activity encouraging” design strategies. The responses from the interviews were generally positive toward incorporating “physical activity encouraging” design strategies, even though most of the participants had little or no exposure to the subject and little to no education on how to implement the design strategy. Many of the participants offered a variety of strategies they currently utilize in their design process. In addition, they also

offered other suggestions. Lastly, the review of literature offered suggested strategies as well. All modifications listed below.

Participant strategies they currently suggested and employed.

- Stair location and usage. As supported by literature, stair use at work has the potential to increase physical activity and decrease obesity (e.g. Mansi, et al., 2009). Stair climbing can be a low-cost and relatively accessible way to add everyday physical activity (e.g. Nicoll & Zimring, 2009).
- Circulation systems. The building's circulation system can also be utilized for "physical activity encouraging" design as stated by some participants. Comprised of the interior spaces, corridors, elevators, stairs, and lobbies that connect the programmed spaces of the building; the circulation system provides opportunities for walking (e.g. Nicoll & Zimring, 2009).
- Computer workstation design. Sit stand computer stations that enable the user to change their position through out the day, which will enable them to can more activity.
- Centralization of basic office needs. These can include copy rooms, break rooms and restrooms. This design strategy encourages the building occupants to be more physically active due the increase in steps from office location to central location.
- On-site Exercise Facilities Providing employees with a company provided method for physical activity. It becomes a personal choice opportunity for physical activity.

Review of literature suggested modifications.

Research has found that obvious methods for implementation could be:

- Vertical circulation paths Vertical circulation paths between individuals and resources that necessitate walking and horizontal circulation paths between individuals and resources that necessitate stair climbing or descent (Finch, 2007).
- Monumental Staircase Use Buildings should be designed with attractive stairwells that are accessible to the general population (Boutelle, et al, 2001). Stair use at work has the potential to increase physical activity and decrease obesity (Mansi, et al., 2009).
- Hybrid Activities Hybrid physical activity results when health or physical activity may not be the primary goal, such as choosing to use the stairs instead of the elevator (Zimring, et al, 2005).
- Unstructured Activities Encompass a more broad description of lifestyle activities undertaken in different domains including domestic work and gardening, walking and cycling for transport or leisure, or work which incorporates physical activities (Gebel, et al., 2005).
- Active Design Techniques Environmental design that encourages stair climbing, walking, bicycling, transit use, active recreation, and healthy eating (Burney, et al., 2010). People are more likely to make healthy behavior choices when these choices are easily available to them

The task of creating activity-friendly buildings may depend a great deal on the integration of environmental philosophies and features of the building's program set forth by the design team. Social and environmental factors play an important role in increasing physical activity (e.g. Addy, Wilson, Kirtland, Ainsworth, Sharpe & Kimsey, 2004).

Worksites are viable settings for reaching large numbers of working adults and

interventions to promote behavior change in such settings could be generalizable, cost-effective, and sustainable (e.g. Pratt, Lemon, Fernandez, Goetzl, Beresford, French, Stevens, Vogt & Webber, 2007). Two participants noted that a client philosophy about health and physical activity incorporation was a key determinant in the execution of them utilizing the design strategy.

Perception theme 5: Reasons for incorporating “physical activity encouraging” strategy

There is no known research regarding interior designers’ perceptions of “physical activity encouraging” design strategies. However, the existing literature does contain conclusions regarding the validity of several strategies, such as individuals are more likely to engage in physical activity if it is provided for them in close proximity to where they live and work (e.g. Wilson, 2010) and creating more “activity-friendly” environments holds promise for improving population-wide physical activity in addition to enabling the long-term success of programs targeting individuals (e.g. King & Sallis, 2009). In this sense the activities could be seen as being ‘embedded’ into the work, by virtue of the design of the facility (e.g. Finch, 2007). Through the use of “active design” techniques building design can increase regular physical activity (e.g. Burney, et al., 2010). Each of these suggestions is supported by the findings of this study.

Design and management tendencies have been developed to make the workplace more compact; this does not encourage physical activity in the office place. Interventions to promote behavior change in such settings could be generalizable, cost-effective, and sustainable (e.g. Pratt, Lemon, Fernandez, Goetzl, Beresford, French, Stevens, Vogt & Webber, 2007). Therefore, at a societal level it is important to support all individuals

with opportunities for regular physical activity and healthier dietary options (e.g. World Health Organization (WHO), 2011).

The choice of being physically active or sedentary can be influenced by the work necessary to participate or the environment one may be exposed too (e.g. Epstein & Roemmich, 2001). As noted by most of the participants, they are aware that people spend most of their lives in buildings (e.g. Zimring, et al., 2005), and with this knowledge they have opportunity to influence the health and well-being of at-work individuals through their design intentions.

#### Motivation themes

Currently, no research exists regarding the motivations practicing interior designers have of “physical activity encouraging” design strategies. The purpose of this study was to create an understanding of what perceptions interior designers may have regarding “physical activity encouraging” interior design strategies, from this study several motivations emerged. The findings regarding these motivations are discussed below.

#### Motivation theme 1: Public/employee health

The majority of the participants in this study mentioned “health” directly at some point during their interviews, indicating that public health may indeed be one of the major concerns for interior designers who pursue physical activity encouraging design strategies. The fact that the majority of participants in this study perceived health to be an important motivation for pursuing “physical activity encouraging” design strategies is consistent with existing research concluding that interior designers can have a direct impact on the built environment’s ability to increase or decrease occupant health (e.g. U.

S. Environmental Protection Agency, 1997, p. 4-5). Designers may pursue “physical activity encouraging” design strategies out of their own, personal beliefs towards health and well-being.

Almost every participant in this study expressed the perception that the health of their end-users is an important concern, and most participants were motivated to provide healthy environments. Understanding physical environmental stimuli in facilities will allow us to create environments that positively affect the health and well-being of occupants (e.g. Dijkstra, Pieterse and Pruyn, 2006).

Public health has traditionally addressed the built environment to tackle specific health issues such as sanitation, lead paint, workplace safety, fire codes, and access for persons with disabilities (e.g. Jackson, 2003). Similar to the review of literature, participants of this study perceive that creating more “activity-friendly” environments holds promise for improving population-wide physical activity in addition to enabling the long-term success of programs targeting individuals (e.g. King & Sallis, 2009). Although there is little research regarding the incorporation of “physical activity encouraging” design strategies, the participant’s of this study indicate the strategy is being used on a moderate level in the field. The increasingly sedentary nature of work and its impact on health and productivity indicators demands the promotion of physical activity at the worksite (e.g. Pronk & Kottke, 2009). The participants of this study who utilized “physical activity encouraging” design strategies realize that their clients have considerable control over the work environment and can easily make small but conscious decisions to change their employees’ habits and behaviors (e.g. Kottke & Pronk, 2006). Physical activity could increase if environments were changed to increase the proximity

and convenience of physical activity and that decreased access to sedentary activities could increase physical activity (e.g. Epstein & Roemmich, 2001).

#### Motivation theme 2: Obesity

The economic consequences of obesity and sedentary lifestyle for employers, business and government are staggering both in health care costs incurred and in lost productivity, and are estimated to rival those of tobacco (e.g. Yancey, et al., 2007). The participants realized that most adults spend a large proportion of each day in a work setting, and that there are potentially significant influences of workplace policies and culture on personal weight-related health behaviors. The participants felt that workplaces can play a vital role in promoting more active lifestyles that will assist in controlling the obesity epidemic (e.g. Yancey, et al., 2007). However, I think most participants did not realize that obesity is a world wide epidemic and there is need for the design fields to become actively involved in creating ways to support health initiatives towards combating obesity, not only at the workplace level but on a societal level.

Several participants expressed their perception that interior environments designed to encourage physical activity would support occupant health and could also improve occupant productivity. This is consistent with existing research that the built environment has been thought to play an important role in influencing obesity by creating a climate that promotes increased energy consumption and a reduction in energy expenditure (e.g. Wilson, 2010). From the perspective of reducing obesity and improving physical activity within the commercial workplace environment, the designers who were interviewed and who utilize “physical activity encouraging” design strategies, realize they should be aware of how safe and attractive they make interior spaces. They should

develop ways to build more physical activity into the workday (e.g. Darling & Heinen, 2009).

### Motivation theme 3: Gained knowledge

Currently, there is not any existing literature on the personal responsibility of designers incorporating “physical activity encouraging” design strategies into their design process. However, most of the participants felt there was a great need for the incorporation of “physical activity encouraging” design strategies and that they would be interested in receiving any education and further research documenting the strategy. Activity-friendly programming may be compatible with some issues that are being actively promoted to the architectural industry (e.g. Zimring, et al., 2005). Each of the participants in this sample made at least one statement alluding to a sense of responsibility toward practicing “physical activity encouraging” interior design solutions. Similar to the review of literature, participants of this study perceive that as design professionals are increasingly embracing sustainable design strategies as part of their design process, so too should they consider the potential effects of their designs on physical activity and wellbeing (e.g. Burney, et al., 2010). The findings from this study suggest that interior designers who actively pursue “physical activity encouraging” design strategies do so primarily of their own decision. As a profession, interior designers need to realize that the decision to engage in “physical activity encouraging” design strategies needs to come from a willingness to promote public health, safety and welfare. Participants from this study are interested in engaging in education and on the job learning as part of their goal of providing the public with awareness of what several termed “smart” design.



Most of the participants interviewed had positive statements towards future intentions on the utilization of physical activity encouraging design strategies. By establishing environmental and policy components in a community or work place, comprehensive intervention has the ability to affect every person living in the environment or jurisdiction affected by that policy. Effects should last as long as the person is in the environment or the policy is in effect (e.g. Glanz & Sallis, 2009).

All of the participants interviewed felt they would begin to incorporate methods of “physical activity encouraging” design into their current practices as more education was available. There is no known research regarding interior designers’ perceptions of the future of physical activity encouragement within interior design. In order to begin to address that hole in the existing knowledge, participants in this study discussed their opinions regarding the future of physical activity encouraging interior design. Each participant believed that physical activity encouragement would continue to grow as an important concern of interior designers. Most expressed their hope that physical activity encouragement would one day become standard, and a few expressed the belief that it will.

The participants interviewed who practice “physical activity encouraging” design strategies may do so out of a sense of moral obligation or because they believe doing so enables them to have a positive impact on their world. Some participants believed that as more people become aware of the obesity epidemic and public health concerns for obesity reduction, more clients and designers will push for physical activity encouraging interior design simply out of a sense of personal responsibility toward improving public health and the health of their employees. Research has shown that an understanding of

the impact of the built environment on obesity may provide information necessary to interior designers to aid in the development of successful prevention efforts.

Although this was a limited study consisting of eight individuals who are currently practicing commercial interior design and had no education on the incorporation of “physical activity encouraging design” strategies, five of eight participants had implemented their own concepts of the strategy into their practice. It was unexpected and encouraging to discover this large of a percentage of the practicing population to be implementing this strategy freely within their practice without education to better service their practice.

Throughout the interview process the researcher was disappointed with the lack of response with interest from the current practicing design community that was solicited for participation in this research. In my opinion those who accepted to participate were interested in the “physical activity encouraging” design strategies, even though the majority admitted to having no knowledge or education for the design strategy. Therefore, in my opinion those who did not respond were not interested in the topic being researched. It was however encouraging that five of the eight designers interviewed had on some occasion implemented the concept of the strategy into their design practice.

With staggering statistics such as 400 million obese and 1.6 billion overweight adults in the world and U.S. citizens spending 90% of their time indoors, the opportunity for the positive encouragement of physical activity is now. The American society has become obesogenic (e.g. Glanz & Sallis, 2009). Physical activity interventions are likely to have positive “side effects” for a range of health-related behaviors and conditions (e.g. King & Sallis, 2009). Multilevel interventions – based on targeting individuals, social

environments, physical environments, and policies must be implemented to achieve population change (e.g. Sallis, et al., 2006). Although the choice to be physically active is largely a personal choice, as a profession we have been taught to design the workplace interiors to promote efficiency and production. This is not a personal choice, it is a workplace culture. Much the same, we can effectively create workplace interiors that promote and encourage physical activity. This may cause a shift in workplace culture that positively affects the employees without losing impact on their productivity and efficiency. Interior designers can enhance as well as implement nation-wide policies of passive intervention that can encourage physical activity of employees. The time has come for the interior design community to take action, as we are charged with designing for the health, safety and welfare of the public. By finding ways to help combat the obesity epidemic, increase our own education on the subject, and subsequently educating our client base, we can help to create environments that promote healthy lifestyles. Using methods and strategies in our design practice that encourage more physical activity within a daily work routine, not only contribute to the overall health, safety and welfare of the building occupants, the incorporation of these strategies are as important as sustainable design and universal design, for creating environments for better public health.

As a profession we need to accept the responsibility to provide an opportunity for individuals to choose a healthier lifestyle. Of course making the choice to participate is held to the individual as a personal choice, however if the opportunity can be provided in such a manner the individual may not realize they are making a healthy choice. Designers could effectively be creating environments that encourage a healthier lifestyle.

Educators for interior design should consider teaching methods for “physical activity encouraging” design strategies, just as they teach sustainability practices. Re-evaluation of past teaching methods for the design of such items as circulation patterns, stair locations, walking distances, floor to floor movement encouraging strategies should be considered. Encouraging and providing the necessary design tools for students to create and design “physical activity encouraging” interior spaces is essential, just as students are now taught to create spaces that are designed to be sustainable, this education will create future designers that are consciously aware of the design decisions they make and how they affect the public.

#### Implications

Determining the different motivations interior designers may have for practicing “physical activity encouraging” design would be useful in a number of ways. First, interior design educators would have a better understanding of what might motivate their students to pursue “physical activity encouraging” and what perceptions their students may hold regarding health and physical activity within the workplace. The question may arise as to whether or not the Council for Interior Design Accreditation (CIDA) standards should be revised to incorporate “physical activity encouraging” design strategies into the standards that are currently taught. This would also help educators in developing curricula for teaching “physical activity encouraging” interior design. Continued research into the characteristics and demographics of interior designers who implement “physical activity encouraging” design strategies into their projects would benefit educators as they develop curriculum to inform both current and future designers about “physical activity encouraging” design. Understanding the values and attributes interior

designers relate to “physical activity encouraging” design could also help educators encourage all students, not just health conscious students, to learn about and practice “physical activity encouraging” interior design.

Companies that manufacture “physical activity encouraging” fixtures, furniture, or equipment would also benefit from this research. Understanding the attributes interior designers identify with these products and what values motivate certain designers to choose “physical activity encouraging” design solutions would allow manufacturers to more effectively brand their products.

This study is potentially useful to those in the practice of commercial interior design as well. Designers would have more clarification as to the perceptions and motivations of other interior designers regarding “physical activity encouraging” design practices. They would also be able to ascertain their own hierarchy of attributes and values by comparing their beliefs to those of the respondents. Having an understanding of interior designers’ motivations for and perceptions of “physical activity encouraging” design could help them to communicate more effectively with health conscious minded clients, end users and other project stake holders. This understanding would also be helpful to them as they try to encourage physical activity among their clients, colleagues, and collaborators who may not otherwise pursue “physical activity encouraging” design solutions.

### Conclusions and Future Areas of Research

The findings in this study begin to provide an understanding of interior designers’ perceptions concerning the need to incorporate “physical activity encouraging” interior design strategies and their perceptions of this strategy in interior design. Several themes

have emerged from this study. These included such themes as the perceptions that “physical activity encouraging” interior design is a personal obligation and that interior designers should take the time to educate clients on the benefits of incorporating physical activity into their building design and programs. See discussion for a full list of themes and subthemes. It was clear that the participants were motivated to incorporate physical activity encouraging design strategies due to the health benefits they provide to their clients and the public who utilized those spaces.

As noted in research physical activity is largely a personal choice based on individual motivations. As the design community moves forward we need to concern ourselves with how much we can influence the public, through our design, with options for more physical activity. Encouraging the population to engage in more physical activity should be an aspect of designing for the health, safety and welfare of the public we serve. Just as we design to meet universal standards for accessibility, our methods for physical activity encouragement incorporation need to become more of a standard. These methods can be encouraged through modifications from our current educational initiatives for students as well as professionals. Based off of Zimring, et al, social ecological model on physical activity, through the findings of this study, there is a missing link between physical environments and physical activity, that link is interior design. The profession of interior design and the incorporation of “physical activity encouraging” design strategies is a missing aspect from the overall picture of obesity. See Figure 13. Through the increased use of these design strategies, physical activity may help to reduce obesity numbers within our population. Through the incorporation of “physical activity encouraging” design strategies into current building designs, a type of

“lifestyle” interventions may be adopted by the building occupants. These interventions could possibly yield positive and long-term effects, in terms of increasing levels of physical activity and reducing sedentariness. Giving individual’s opportunities to perform shorter duration periods of physical activity throughout their daily endeavors would promote a healthier lifestyle and happier work environment.

However there were also notable differences among participant responses regarding topics such as their perceptions of the necessity of education on “physical activity encouraging” design strategies and whether or not the strategies should be incorporated into all commercial spaces, which varied from participants who had only positive perceptions, to participants with critical, negative perceptions. Additionally each participant indicated a preference for pursuing “physical activity encouraging” design strategies. However some participants indicated that this pursuit is a daily occurrence for all of their projects, while others indicated that they were more likely to practice “physical activity encouraging” design strategies on a case-by-case basis, depending on individual client concerns.

In 2009, Volkswagen launched an initiative to see what methods or concepts people could visualize for means of incorporating “fun” into daily routine. The premise behind the competition was that something as simple as fun may be the easiest way to change people’s behavior for the better. One entry was to encourage more stair use, in a subway the staircase next to the elevator was turned into a piano. They increased the use of the stairs by 66%. If individuals are given something fun to do, they will most likely be more interested in performing that activity. Therefore, it may be possible to increase physical activity if it is made to be fun. By incorporating this level of design strategy

into commercial workplace environments, the occupants may be more encouraged to get up and move if the activity is seen as fun rather than as exercise.

Recently, more research was conducted on the effects of incorporating “fun” as a means of physical activity into daily work activities. Developments in computer software that are based off of movement games are enabling users to read email and sort photos through use of a floor mat that engages the individual to be physical active while utilizing the computer software. Other such software encourages movement of any kind that is then tracked, by a device the users wears on their person, through software that is linked to a database. This information can also be used to compete with other individuals. If such methods could be incorporated into daily activities, within a work environment, could they be an effective method of physical activity that also allowed the participant to continue working?

Some participants seemed to be primarily concerned with clients’ health, while others seemed to consider the design requests of their clients and project budgets to be of primary concern. While each participant perceived “physical activity encouraging” design strategies to be an important issue, there were varying motivations among the participants.

Most of the participants felt that it was a personal responsibility to pursue “physical activity encouraging” design strategies. Other participants indicated that their first exposure to “physical activity encouraging” design strategies happened while they were designing for a client who wished to pursue this incorporation. Several participants mentioned that they pursue “physical activity encouraging” design strategies when possible, though some of the participants stated that they pursued physical activity



encouraging design strategies in all of their projects. Despite the differences in experience, commitment level, and education, each participant expressed the perception that physical activity encouraging design strategies will continue to grow in prominence within the interior design industry. Most participants perceived the future of “physical activity encouraging” design strategies to be promising, and several believed that one day all interior design projects will be designed using physical activity encouraging design strategies. Positive motivation and engagement of senses may promote more physical activity. Interior designers have the capabilities to be innovative about methods for encouraging more physical activity into our workplace environments. Interior designers should look within the Exercise and Sports Science body of knowledge for methods in which to incorporate and encourage physical activity. Physical activity encouragement could have the potential to increase productivity from building occupants as well as provide opportunities for employees to interact with one another. By providing opportunities for chance meetings and intermingling through physical activity, employees may be more productive through out their work day.

#### Areas for future research

This study was exploratory in nature. The subject sample was small, but included practicing interior designers from across the United States, and included only those designers who currently practice commercial interior design. For these reasons, there are several opportunities for future research.

- A quantitative study could be conducted on a national level to obtain a basis of knowledge of whether “physical activity encouraging” design strategies should be mandated. Just as ADA mandates the profession of interior design, design

commercial spaces to a level of universal design and the soon to be adopted Green Building Codes mandate sustainable design standards through building code, should physical activity encouraging design be required? Or should the incorporation of the strategy be left to the personal choice of the designer and design team? How does this affect the welfare of the public, should that be an impact on the decision of whether or not to pursue this strategy?

- Education at the professional level – Interior designers currently practicing do not have access to valuable education on the subject of physical activity encouraging design. A focus group could be held regionally to determine what methods would be most beneficial to practicing interior designers for gained knowledge as well as implementation within their practice. As regional differences could have influence over what methods are more effective for implementation. These findings could also help interior designers who practice physical activity encouraging design strategies to develop better arguments for convincing their peers to pursue physical activity encouraging design strategies.
- Further research could focus on interior design programs providing the necessary knowledge for the implementation of “physical activity encouraging” design strategies into the design curriculum. Interior design programs include an emphasis or special classes on sustainability, should there be a class dedicated to encouraging physical activity into design strategies? Should the programs teach “physical activity encouraging” design strategies as either an integral or optional part of the design process itself? Neither the existing literature nor the current study provide clarity as to which approach is best suited to promoting physical

activity encouraging design strategies among interior design students. Findings from such a study could help educators develop educational opportunities specifically for those who are unfamiliar with, or who do not perceive a need for, physical activity encouraging design strategies.

- A phenomenological study could be conducted on a national level to determine what public knowledge exists about the current obesity epidemic and “physical activity encouraging” design strategies within a workplace environment. Most of the participants from this study stated that their clients were not educated on the subject of “physical activity encouraging” design strategies. A study to determine public knowledge as well as provide education to the public about obesity and encouraging physical activity within workplace environments would be beneficial to interior designers who are implementing these strategies within their current practice. More public awareness on the subject would bring more interest to the incorporation of physical activity encouraging design strategies.
- Research could be conducted to determine if productivity amongst employees would be increased if they perceived their work environment to provide them with health opportunities. Also, if an increase in healthy activity and lifestyle in turn made them feel happier while at work. Would more physical activity lead to this increase perceived happiness?
- A focus group could be held in various regions to determine if an interior designers’ perceived level of support from colleagues affects his or her decision making regarding, or ability to pursue, “physical activity encouraging” design strategies? If so, how? As there is no existing research regarding the effects of

colleagues on a designer's ability to practice "physical activity encouraging" design solutions, research in this area would be a beneficial addition to the knowledge on "physical activity encouraging" interior design. This study may also provide an overall understanding of interior designers' perceptions concerning the design of commercial workplace interiors that encourage and support physical activity, no individual perceptions or motivations appear to be the largest or most common concern. Interior designers need to consider all the many different built environments to which humans are exposed across their lives.

**Table 1** : Examples of early codes in grounded theory analysis of Case Study Y data

Interview Text	Codes
From my perspective	Personal view
the main challenge is	Assertion
in changes in technology	Changes in technology
or the product improvement	Changes in product
done by the COTS supplier.	Assertion Changes by Supplier
You	Pronoun shift
can never guarantee that	Assertion Uncertainty
if you are buying several,	Procurement
they will all be the same.	Product consistency Necessary condition
Yes,	Affirmation
when you come to buying PCs	Procurement of hardware
a lot of our products now are delivered with the software already loaded on the PCs.	Integrated products Hardware Software
that causes you to go through an inspection,	Extra work Costs in human effort Costs in time
We weren't happy,	Dissatisfaction
it was costing us extra money.	Costs in money
Last year this part of Company Y organised a forum workshop seminar on COTS,	Extra work Action due to COTS shortfall
and as part of that we did a survey of a number of our projects on problems and issues with using COTS	Extra work Implementation difficulty
the short time that components become obsolete.	Short time to obsolescence

Source: Allan, 2003

## Table 2: Survey Questions

### Survey Questions

The survey is demographic in nature and intended to elicit data that will provide context to subsequent interview data.

1. What is your gender?
2. What is your age?
3. What is your employment type?
  - a. Employee at a large firm (100+ employees)
  - b. Employee at a medium firm (25-99 employees)
  - c. Employee at a small firm (1-24 employees)
  - d. Independent contractor/consultant
  - e. Owner/Partner at a firm
4. How many years have you been a practicing Interior Designer?
5. What is the highest level of education you have completed?
  - a. Associates
  - b. Bachelors
  - c. Masters
  - d. Doctorate
6. If you hold a Bachelors degree, was your Interior Design program CIDA (formerly FIDER) accredited?
  - a. Yes
  - b. No
  - c. Unsure
7. In what area of Interior Design do you specialize? Check all that apply:
  - a. Residential
  - b. Hospitality
  - c. Corporate
  - d. Mixed-Use
  - e. Institutional
  - f. Other (please identify)
8. How many years have you been practicing within your current specialty?
9. Have you changed specialties during your career?
10. If you answered “Yes” to Question 9, how many specialties have you practiced?
11. Are you a member of any of the following professional organizations? Check all that apply:
  - a. ASID
  - b. IIDA
  - c. NEWH
  - d. NKBA
  - e. Other (please identify)

12. Do you hold any of the following professional certifications? Check all that apply:
- a. NCIDQ
  - b. LEED A.P.
  - c. CKD
  - d. Other (please identify)

Table 3: Interview Questions

Interview Questions

The first set of questions will address such topics as whether or not the participant has had exposure to creating environments that encourage physical activity in the commercial work place and, if so, what type of exposure has the participant had and when did that initial exposure take place.

1. So far in your career as an interior designer, have you had any experience with or exposure to creating work place environments that encourage physical activity?
2. Could you describe the context of your first exposure to creating commercial work place environments that encourage physical activity?
3. What are some of the physical activity encouraging strategies for the commercial work place you have used in your interior design projects?
4. Have you received any education regarding physical activity encouraging interior design strategies? If so, please describe them.
5. What types of physical activity encouraging design projects have you been involved with? For example: specialty, average size, and budget.
6. Please describe your overall experience with physical activity encouraging interior design.

The second set of questions will be open-ended and are meant to elicit the designers' perceptions of physical activity encouraging design in the commercial work place. Participants will be asked to relate their experiences with physical activity encouraging interior design practices.

1. How often have you used physical activity encouraging design strategies in your practice?
2. Is encouraging physical activity in the commercial work place an important issue to you?
3. If you feel that encouraging physical activity is important, why? In what context(s)?
4. What is your overall opinion of encouraging physical activity as it relates to interior design?
5. When/if you choose to pursue physical activity encouraging design strategies, why do you do so? (If not, why not? If/when applicable)
6. How do you perceive your ability to make physical activity encouraging design decisions?
7. Do you feel you have the proper education, training, or experience to effectively practice physical activity encouraging interior design strategies? Please elaborate.
8. What level, if any support do you feel you receive for the pursuit of physical activity encouraging interior design strategies? From employers/supervisors, colleagues/coworkers, and consultants.



9. Do you feel your clients are interested in physical activity encouraging interior design? Please elaborate.

10. Have you found any regional differences or work culture differences that have encouraged or discouraged you from making decisions to incorporate physical activity encouraging design?

The last set of questions will address the participants' future intentions toward physical activity encouraging interior design strategies.

1. Do you believe you will continue to practice physical activity encouraging interior design strategies in the future? Why or why not?

2. Do you expect encouraging physical activity in the commercial work place to become more or less important to your practice and to your clients in the future?

3. What are some of the advantages you see to pursuing physical activity encouraging design strategies? Both for your clients and your interior design business.

4. What are some of the disadvantages you see to pursuing physical activity encouraging design strategies? Both for your clients and your interior design business.

5. Do you have any additional thoughts regarding the future of physical activity encouraging interior design?

Table 4: Axial Code; Interview 1 – LJ

Interview Text – Interview 1 - LJ	Codes
Client request for physical activity incorporated into design	Employee Health, Business
Placement of individuals/teams	Building design strategies
Circulation patterns encourage PA	Building design strategies
No education on subject of PA	Lacking resources
City Projects, Higher Education Projects	Diversity
Very important topic, little knowledge	Personal View, Lacking Resources
Depends on project scope, client	Company Strategies
Issue has great importance	Personal View
Little client request	Lack of interest, knowledge
Subject becoming more important to interior design	Personal view
Healthier lifestyle for employees	Public Health
Cost impacts could be negative	Extra money, client dissatisfied
Inspirational concept, should become design standard	Personal view

Table 5: Axial Code; Interview 2 - JD

Interview Text – Interview 2 - JD	Codes
incorporate purposeful methods for employees and visitors	Building Design Strategies
Building elements can support PA encouragement	Building design strategy
Stair use, lighting enhancement, encouraging signage	Building design strategy
No formal education, firm is dedicated to creating healthy environments	Lacking resources, company strategy
Hospitals, K-12, institutional	Building design strategy, company strategy
Client resistance, given education they are positive on incorporation	Lack of interest – clients
Implement as often as possible	Company strategy
Important issue	Personal, assertion
Obligation to provide health, safety and welfare for occupants	Personal view, building design strategy
Obesity is alarming issue in US, designers can make a difference	Personal view, assertion
Incorporation into all projects if possible, important issue	Personal view, building design strategy
Always room for more education, much needed	Lacking resources
Learned methods are company practices, no formal education	Lacking resources, company strategy
Great firm support, but more efforts toward sustainability	Company strategy, lacking interest
Clients unaware, more public education is needed	Lacking resources, lacking interest, education
Smaller towns offer more resistance	Lacking interest
Important to be proactive in creating healthy environments	Building design strategy, personal view, assertion
Healthy employees = healthy business	Employee health
No disadvantages, lack of education for everyone	Lacking resources
Opportunity for education is now	Lacking resources, personal view, assertion

Table 6: Axial Code; Interview 3 - CJ

Interview Text – Interview 3 - CJ	Codes
Hotels usually have gyms, no need for PA design strategies	Personal view
No education on subject of PA	Lacking resources
Not client priority or interest	Lack of interest
Never use strategy in design practice	Lack of interest
Creating environment for work is more important	Personal view
Only important for senior living and healthcare	Assertion
Space is a premium, could impact cost	Extra cost to client
No education needed, leave it to healthcare field	Personal view
Not practical for small companies	Extra cost to client
Would use only if requested	Client perspective
Benefit: healthier lifestyle for employees	Employee health
Con: loss of client money	Extra cost to client
Benefits like insurance are more important to employees	Personal view

Table 7: Axial Code; Interview 4 - KE

Interview Text – Interview 4 – KE	Codes
No current exposure or job experience	Limited knowledge
Minimum education	Lacking resources
Important issue/topic	Personal view
Incorporating physical activity is important design strategy	Assertion
Beneficial to employees	Public Health, Business Productivity
Should be required design standard	Public health
Health is important to companies	Company strategy, Public Health
Need more client support	Company strategy
Healthy employees equal better productivity	Business productivity, Employee Health
Return clients if satisfied with design outcome	Design business growth
Look forward to more education and support of topic	Personal View

Table 8: Axial Code; Interview 5 – MH

Interview Text – Interview 5 - MH	Codes
Company strategy to use PA strategy in design	Building design strategy
No education on subject	Lacking resources
Large corporate projects, nationwide	Diversity
Suggest to clients to use PA strategies in design	Building design strategy, public health
Positive health work environments with use of PA strategy equals healthy employees	Building design strategy, employee health
Imperative to encourage PA in design strategy	Assertion
Impact on health and welfare of employees	Employee Health
Wellness as a benefit of design	Building design strategy, employee health
PA will become more important to design	Public health, personal view
Healthier employees equals better work environment	Employee health
LEED encouraging better design for better health	Personal view

Table 9: Axial Code; Interview 6 – CD

Interview Text – Interview 6 – CD	Codes
No client request, no client interest	Limited Knowledge, cost of business
Company culture discourages extra PA	Employee Health
Collaborative or shared spaces that encourage employees to leave desk – use PA	Employee Health
No education	Lacking resources
No specific request on project	Limited knowledge
Projects driven by space and availability	Cost of business
Is important issue, many people are obese	Community health
If employees are encouraged to be PA they gain health	Personal view
Should be part of each design project just as sustainability and accessibility	Personal view, design strategy
No support from company or client	Business strategy, cost of business
More education might encourage more PA incorporation into design	Limited knowledge, personal view
Corporate work cultures show office size as status, walking to copier is considered inconvenience	Personal view, work culture
More education on topic would equal more practice of strategy	Personal view, limited knowledge
Advantages of PA are employee wellness	Employee Health

Table 10: Axial Code; Interview 7 – EP

Interview Text – Interview 7 – EP	Codes
No exposure to PA strategy	Limited knowledge
No education on subject of PA strategy	Lacking resources
Does not use strategy currently	Uncertainty
Retail design focused on sales	Cost of business
Very important topic	Personal view
Public needs encouragement to be physically active	Personal view, Public health
Healthy employees equal productivity	Cost of business, Employee health
Not used in retail design, sale strategy more important	Design strategy, Assertion
No client request	Cost of business
Important to interior design	Personal view
Healthier employees equal healthier business	Employee health, Cost of business



Table 11: Axial Code; Interview 8 - SC

Interview Text – Interview 8 - SC	Codes
Clients not willing to walk, no incorporation	Lack of interest – clients
Have utilized in children’s area	Building design strategies
No experience with commercial work places incorporation	Lack of interest, knowledge
Created conceptual projects with PA encouragement	Building design strategy
No education on PA encouraging design	Lacking resources
Have only incorporated work out facilities, no PA encouraging strategies	Building design strategy
Important issue, obesity is major problem in U.S.	Personal view
Work places should include opportunities, but not forcefully	Personal view, building design strategy
Positive opinion of PA, shouldn’t be mandated	Building design strategy, personal view
Choose to pursue as moral obligation	Personal view, assertion
Interior environments should encourage occupant well-being	Personal view, assertion, building design strategy
More client involvement and encouragement is needed	Lacking resources
No design team support	Lacking resources, lack of interest
Include strategy as much as possible	Building design strategy
Needs public awareness like LEED for wide spread use	Personal view, building design strategy, lacking resources
Important for healthy employees with sedentary lifestyle	Employee health
Negative: could be distracting, take time away from work	Building design strategy

Table 12 - Provisional Codes (Coding Trees) from Interviews 1-8 – Motivation Themes

Motivation Theme 1: Public/employee health

- Productivity
  - Positive work environment
  - Healthy environment
- Employee Satisfaction
  - Healthy employees
  - Less sick time
- Public awareness
  - Similar to LEED
- Occupant well-being

Motivation Theme 2: Obesity

- Healthcare costs
- Employee health
- Business productivity

Motivation Theme 3: Gained knowledge

- Public awareness
- Designer knowledge
- Design strategies

Table 13 – Provisional Codes (Coding Trees) from interviews 1-8 – Perception Themes

Perception Theme 1: Education

- Lacking resources
- Limited knowledge

Perception Theme 2: Client interest

- Extra cost
- Company culture
- Lack of education
- Cost of business

Perception Theme 3: Client attitude

- Positive vs. negative
- Lack of knowledge
- Interest

Perception Theme 4: Current design methods

- Design standard
- Firm/colleague support
- Education

Perception Theme 5: Reasons for incorporating strategy

- Public health
- Moral obligation
- Occupant well-being
- Obesity – public issue
- Increase physical activity

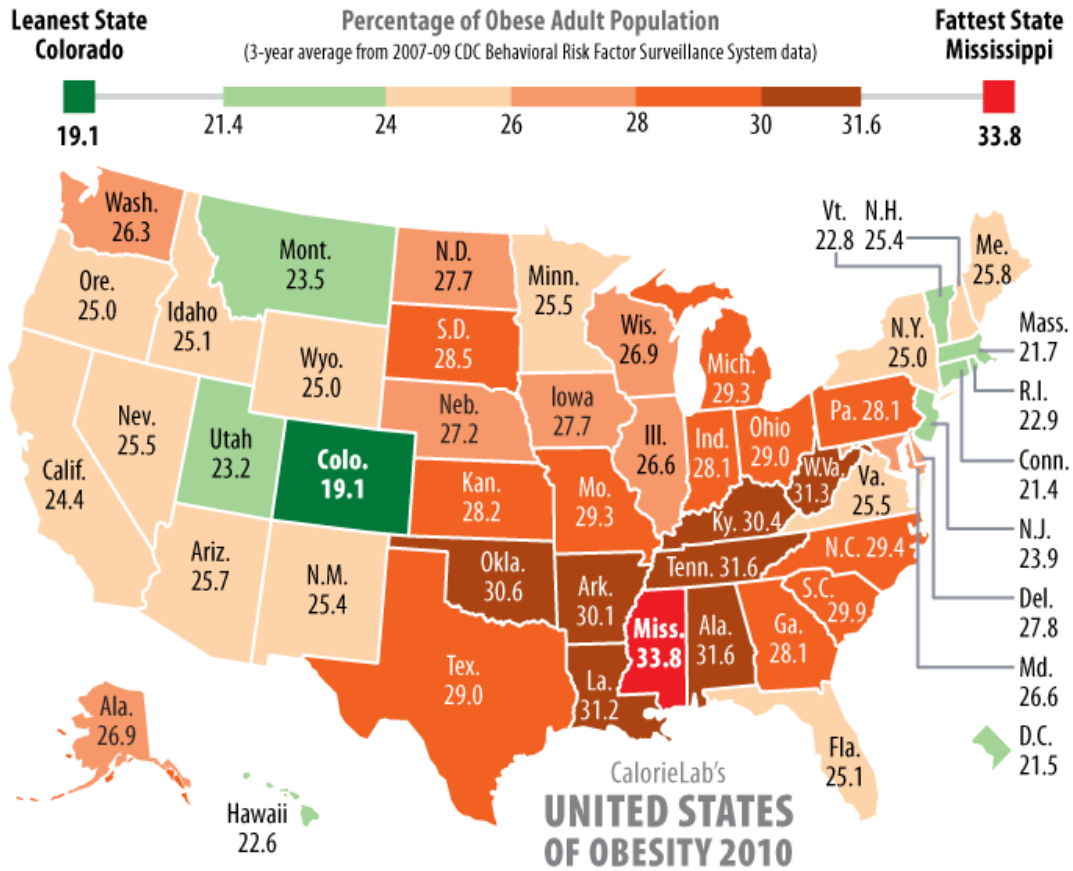


Figure 1: Percentage of Obese Adult Population by State  
Source: Centers for Disease Control, 2010, website.



Figure 2: Economic costs of Obesity  
 Source: Centers for Disease Control, 2009, website.

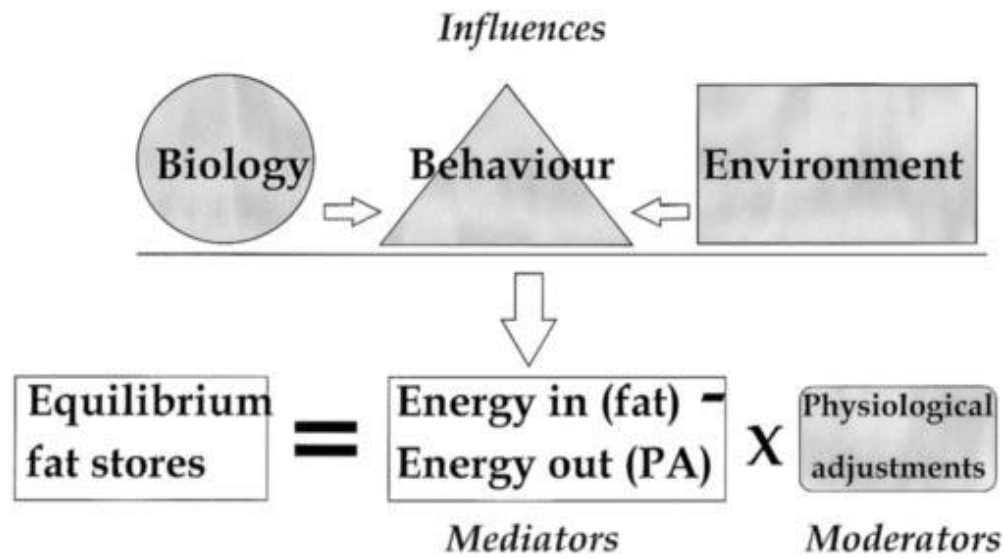


Figure 3: Ecological Model for understanding obesity

Source: Swinburn, et al, 1999

## ANGELO FRAMEWORK

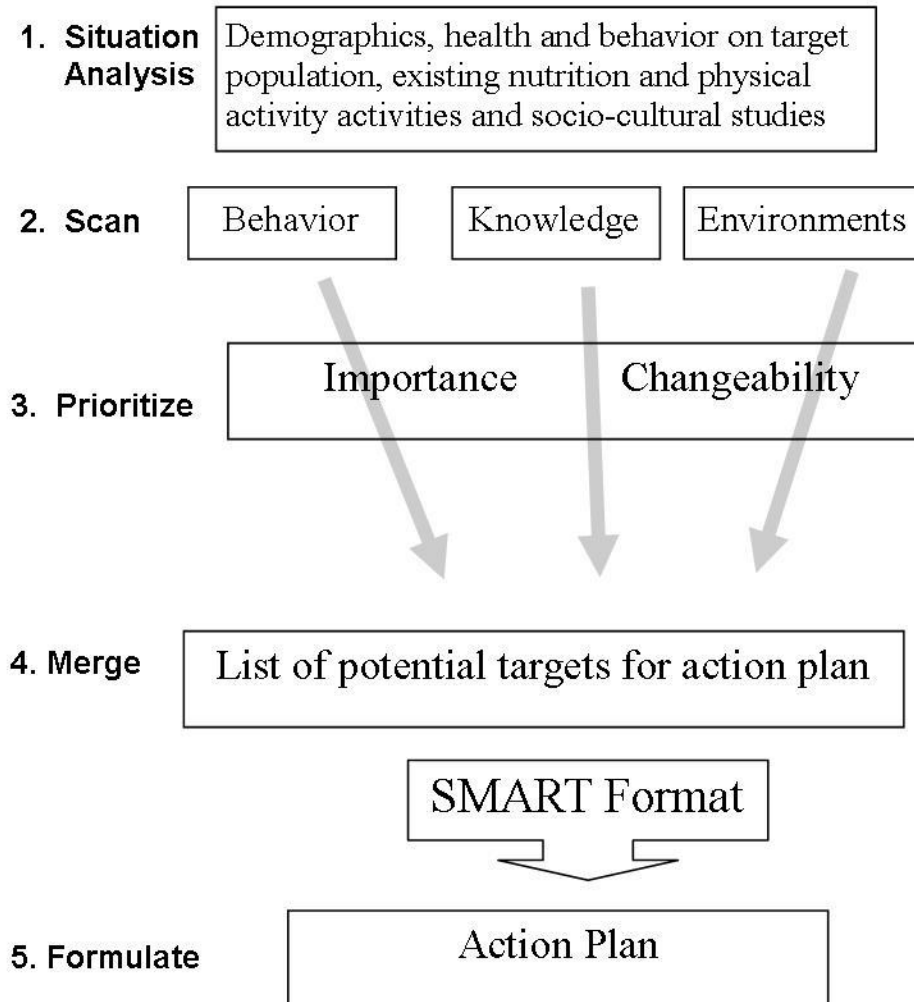


Figure 4: ANGELO Framework

Source: Swinburn, et al, 1999

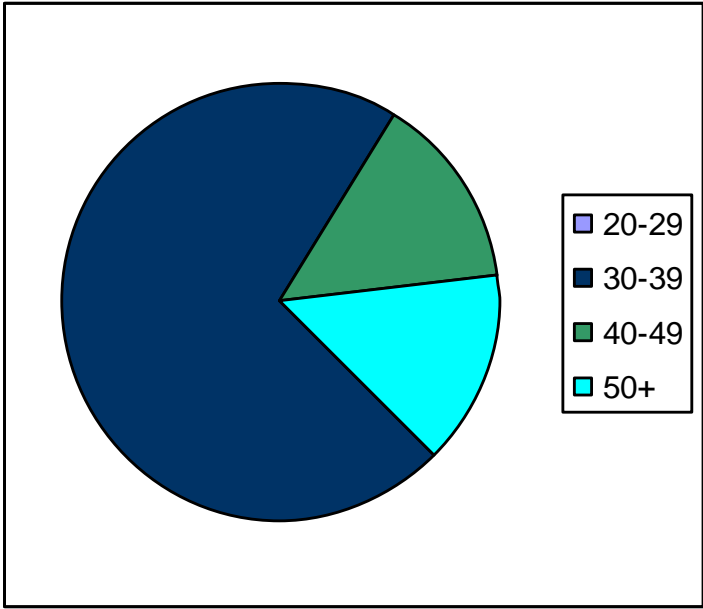


Figure 5 – Demographic Findings – Participant Age ranges



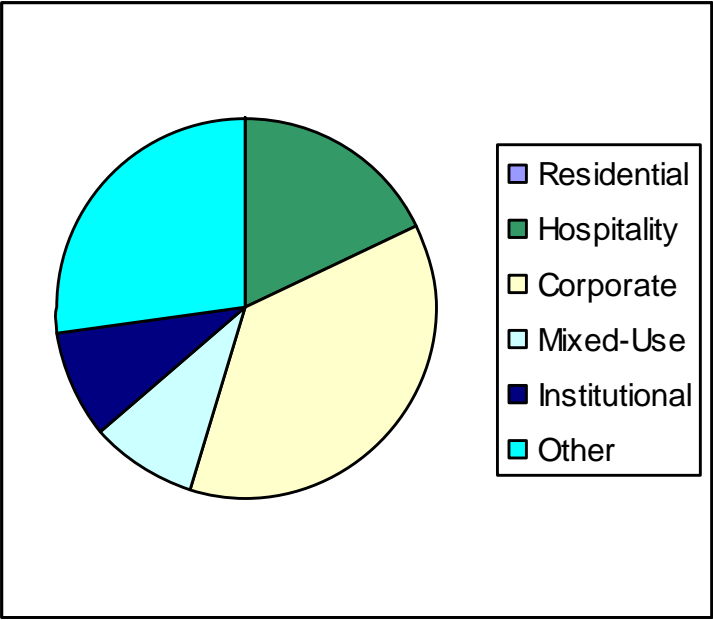


Figure 6 – Demographic Findings – Participant Areas of Practice

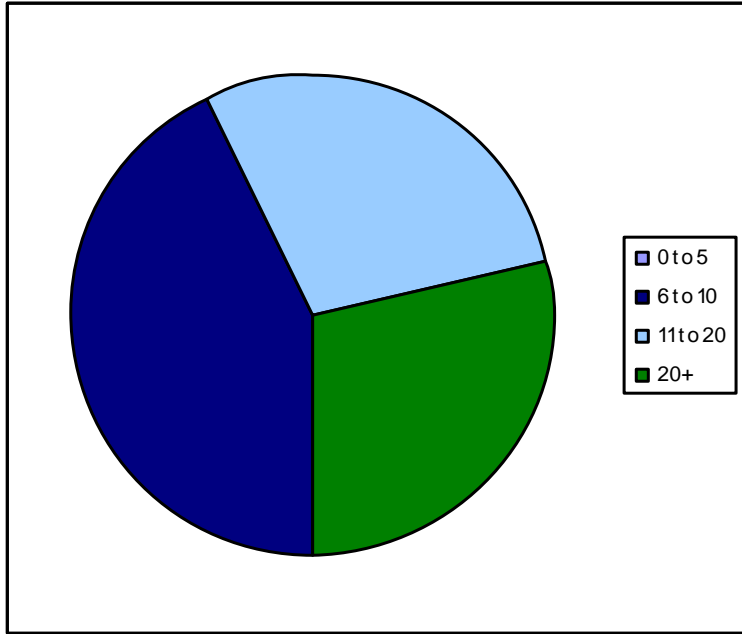


Figure 7 – Demographic Findings – Participant Years of Practice

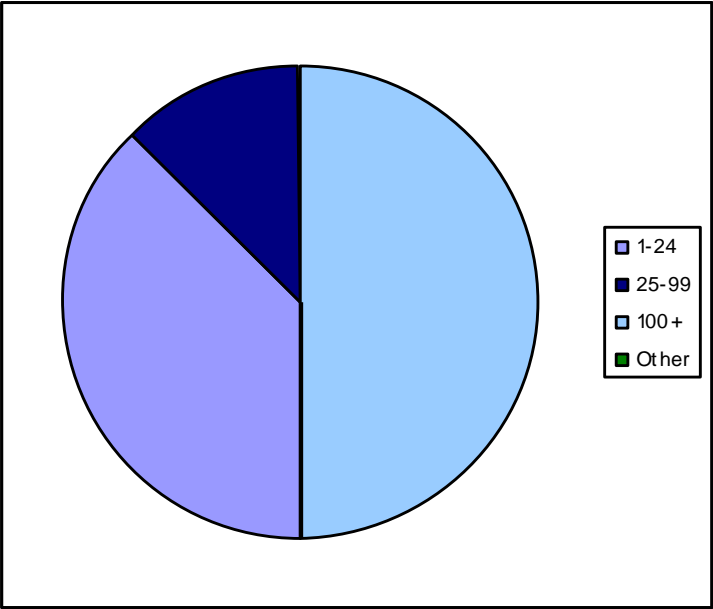


Figure 8 – Demographic Findings – Firm Size

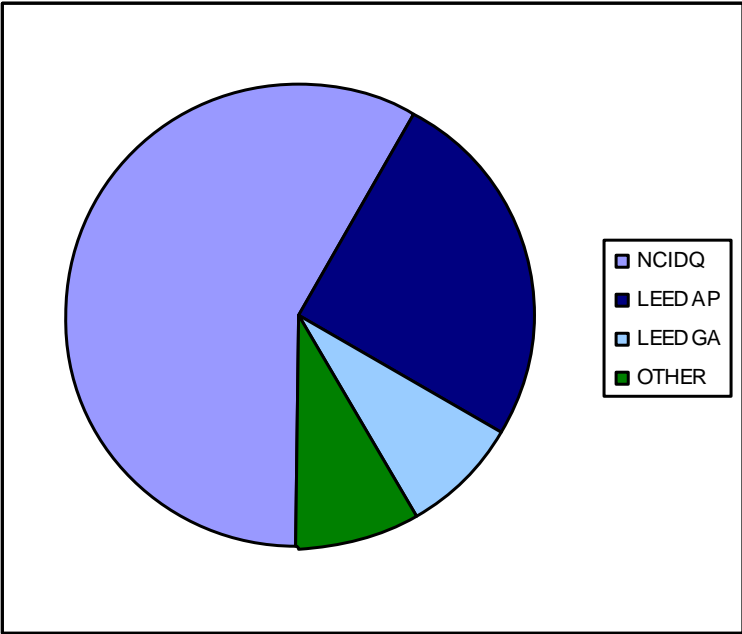


Figure 9 –Demographic Findings – Certifications

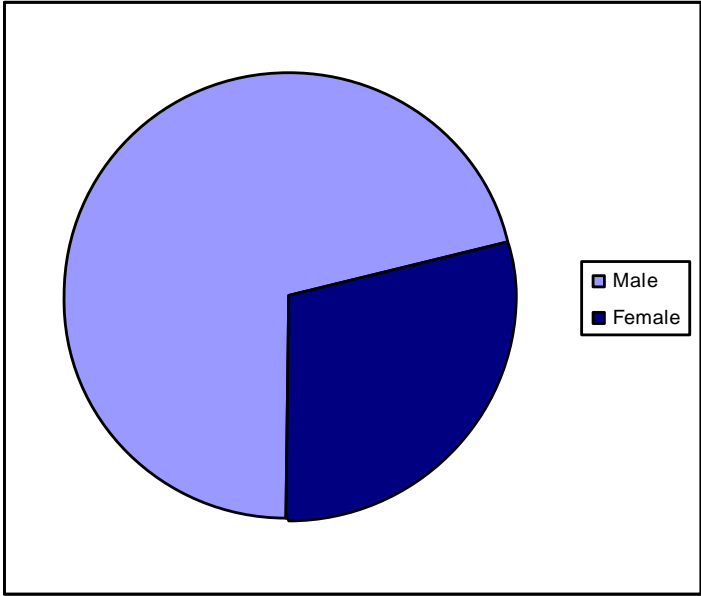


Figure 10 – Demographic Findings – Gender

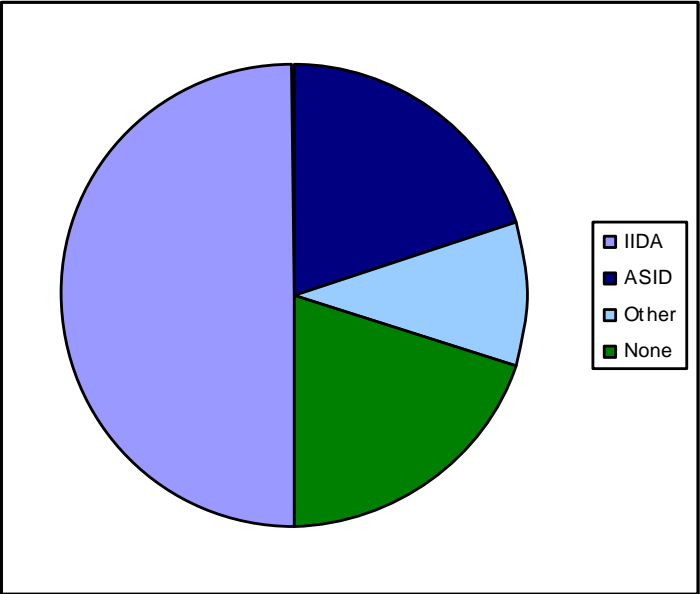


Figure 11 – Demographic Findings – Professional Association



Figure 12: Issues identified regarding the incorporation of physical activity into workplace design solutions.

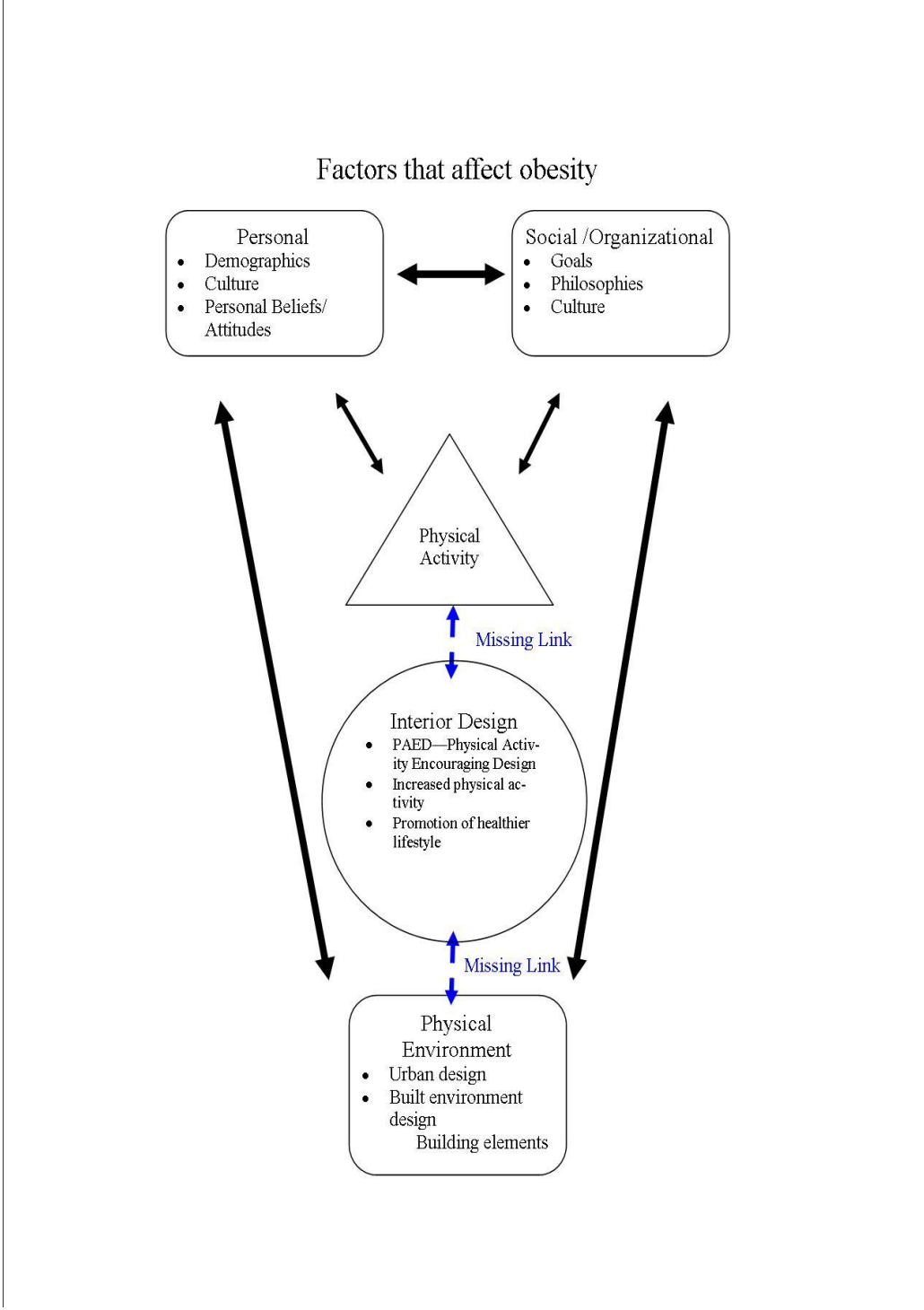


Figure 13: Findings Model: Factors that affect obesity



## REFERENCES

- Addy, C.L., Wilson, D.K., Kirtland, K.A., Ainsworth, B.E. Sharpe, P., & Kimsey, D. (2004). Associations of Perceived Social and Physical Environmental Supports With Physical Activity and Walking Behavior *American Journal of Public Health*, 94(3), 440-443.
- Allan, G. (2003, July). A critique of using grounded theory as a research method. *e-Journal of Business Methods*, 2(1), 1-10, retrieved from: <http://www.ejbm.com>
- Allen, D. (2004). Impacts of our built environment on public health. *Environmental Health Perspectives*, 112(11), A600-A601.
- Boeije, H. (2002). A Purposeful Approach to the Constant Comparative Method in the Analysis of Qualitative Interviews. *Quality & Quantity*, 36, 391-409.
- Boeije, H. R., Bromberger, N., Duijnste, M. S. H., Grypdonck, M. H. F. & Pool, A. (1999). *In relatie tot MS. Zorgafhankelijke mensen met Multiple Sclerose en hun partners*. Utrecht: NIZW.
- Booth, K. M., Pinkston, M.M., & Poston, W.S.C., (2005). Obesity and the Built Environment. *Journal of the American Dietetic Association*, 2 (45), S110-S117.  
doi: 10.1016/j.jada.2005.02.045
- Boutelle, K., Jeffery, R., Murray, D., & Schmitz, K. (2001). Using signs, artwork and music to promote stair use in a public building. *American Journal of Public Health*, 91, 2004-2006.
- Bowles, M. (2008, Fall). The Workplace of the Future. *Perspective* Retrieved from <http://www.iida.org>
- Burney, D., Farley, T., Sadik-Khan, J., & Burden, A. (2010). *Active Design Guidelines*. Retrieved from <http://ddcftp.nyc.gov/adg/>
- Carnethon, M., Whitsel, L.P., Franklin, B.A., Kris-Etherton, P., Milani, R., Pratt, C.A., Wagner, & Gregory R. (2009). Worksite Wellness Programs for Cardiovascular Disease Prevention. A Policy Statement from the American Heart Association. *Circulation*, 1725-1741.
- Chilton, J.J. & Baldry, D. *The Effects of Integrated Workplace Strategies on Commercial Office Space, Facilities*, Vol 15 (7/8) July/August 1997. pp. 187-194
- Churchill, S. D., & Wertz, F. J. (no date). *An introduction to phenomenological psychology for consumer research: Historical, conceptual, and methodological foundations*, (Advances in Consumer Research Article). Association for Consumer Research, 550-555.
- Creswell, J. W. (2007). *Qualitative Inquiry & Research Design: Choosing Among Five Approaches*, 2<sup>nd</sup> Edition. Thousand Oaks, California: SAGE Publications, Inc.
- Creswell, J. W. (2009). *Research Design: Quantitative, Qualitative, and Mixed-Methods Approaches*, 3<sup>rd</sup> Edition. Thousand Oaks, California: SAGE Publications, Inc.
- Dehghan, M., Akhtar-Danesh, N., & Merchant, A.T. (2005). Childhood obesity, prevalence and prevention. *Nutrition Journal*, 4, 4-24. doi:10.1186/1475-2891.1.4

- Dijkstra, K., Pieterse, M., & Pruyn, A. (2006). Physical environmental stimuli that turn healthcare facilities into healing environments through psychologically mediated effects: systematic review. *Integrative Literature Reviews and Meta-Analyses*, doi: 10.1111/j.1365-2648.2006.03990.x.
- Epstein, L. H., & Roemmich, J.N. (2001). Reducing Sedentary Behavior: Role in Modifying Physical Activity. *Exercise and Sport Science Reviews*, 29(3), 103-108.
- Evans, G.W., (2003) The Built Environment and Mental Health. *Journal of Urban Health: Bulletin of the New York Academy of Medicine*. 80(4), December 2003
- Ewing, R., Schmid, T., Killingsworth, R., Zlot, A., & Raudenbush, S. (2003). Relationship Between Urban Sprawl and Physical Activity, Obesity, and Morbidity. *American Journal of Health Promotion*, 18 (1), 47-57.
- Finch, E. (2007). The Health Impact Of Space Planning Policies In Relation To Walking And Exercise In The Workplace. *Proceedings of Clima 2007 WellBeing Indoors, Scotland, 1725-1732*.
- Frank, L.D. & Engelke, P.O. (2003). *Health and Community Design: The impact of the built environment on physical activity*. Washington, DC: Island Press.
- Frank, L. D., Anderson, M.A., Schmid, T.L. (2004). Obesity Relationships with Community Design, Physical Activity, and Time Spent in Cars. *American Journal of Preventive Medicine*, 27 (2), 1-13. doi: 10.1016/j.amepre.2004.04.011
- Gebel, K., King, L., Bauman, A., Vita, P., Gill, T., Rigby, A. & Capon, A. (2005) *Creating healthy environments: A review of links between the physical environment, physical activity and obesity*. Retrieved from the University of Sydney, NSW Health Department and NSW Centre for Overweight and Obesity website: <http://sydney.edu.au/medicine/public-health/coo/publications/creatin.php>
- Glaser, B.G. (1965). The Constant Comparative Method of Qualitative Analysis. *Social Problems*, 12 (4), 436-445.
- Glaser, B. (2002). Conceptualization: On Theory and Theorizing Using Grounded Theory. *International Journal of Qualitative Methods*, 1(2), 23-38
- Glaser, B.G. with the assistance of Judith Holton (2004). Remodeling Grounded Theory [80 paragraphs]. *Forum Qualitative Sozialforschung / Forum: Qualitative Social Research*, 5(2), Art. 4, <http://nbn-resolving.de/urn:nbn:de:0114-fqs040245>
- Grantmakers in Health. (2007). *Reversing the Obesity Epidemic* (Issue Brief No. 28). Washington, DC: B. Ewig.
- Handy, S.L., Boarnet, M.G., Ewing, R., Killingsworth, R.E. (2002). How the Built Environment Affects Physical Activity Views from Urban Planning. *American Journal of Preventive Medicine*, 23(2S), 64-73.
- Haq, S., & Zimring, C. M. (2003). Just down the road a piece: The Development of Topological Knowledge of Building Layouts. *Environmental Behavior*, 35,132– 160.
- Heinen, L. & Darling, H. (2009). *Addressing Obesity in the Workplace: The Role of Employers*. The Millbank Quarterly, Vol. 87 (1). pp. 101-122.
- Hendrick, B. (2010, June 29). Obesity Rate Swells in 28 States [Article]. Retrieved from <http://www.webmd.com/diet/news/20100629/obesity-rate-swells-in-28-states>

- Hertz, R.P. & McDonald, M. (2004). *Obesity in the United States Workforce*. Findings from the National Health and Nutrition Examination Surveys (NHANES) III and 1999-2000. Retrieved from Pfizer website: [http://www.pfizer.com/files/.../Obesity\\_in\\_the\\_United\\_States\\_Workforce.pdf](http://www.pfizer.com/files/.../Obesity_in_the_United_States_Workforce.pdf)
- Jackson, L.E., (2002). The Relationship of urban design to human health and condition, *Landscape and Urban Planning*, Vol. 64. pp. 191-200.
- Jackson, R. (2003). The Impact of the Built Environment on Health: An Emerging Field *American Journal of Public Health*, 93(9), 1382-1384.
- Kahn, E.B., Ramsey, L.T., Brownson, R.C., Heath, G.W., Howze, E.H., Powell, K.E., Stone, E.J., Rajab, M.W. & Corso, P. (2002). The Effectiveness of Interventions to Increase Physical Activity: A Systematic Review. *American Journal of Preventive Medicine*, 22(4S), 67–72.
- Kerr, J., Eves, F., & Carroll, D. (2001). Encouraging stair use: stair-riser banners are better than posters. *American Journal of Public Health*, 91, 1192–1193.
- Kerr, K.A., Yore, M.A., Ham, S.A., & Dietz, W.H. (2004). Increasing Stair Use in a Worksite through Environmental Changes. *American Journal of Health Promotion*, 5, 312–15.
- King, A.C., & Sallis, J.F. (2009). Why and how to improve physical activity promotion: Lessons from behavioral science and related fields. *Preventive Medicine* 49, 286–288. doi:10.1016/j.ypmed.2009.07.007
- King, A.C., Stokols, D., Talen, E., Brassington, G. S., & Killingsworth, R. (2002). Theoretical Approaches to the Promotion of Physical Activity – Forging a Transdisciplinary Paradigm. *American Journal of Preventive Medicine* 2002, 23 (2S).
- Kottke, T.E., & Pronk, N.P. (2006). Physical activity: optimizing practice through research. *American Journal of Preventive Medicine*, 31, S8–S10.
- Krizek, K.J., Birnbaum, A.S., & Levinson, D.M. (2004). A Schematic for Focusing on Youth in Investigations of Community Design and Physical Activity. *American Journal of Health Promotion*, 19(1), 33-38.
- Levine, J.A., & Miller, J.M. (2007). The energy expenditure of using a “walk-and-work” desk for office workers with obesity. *British Journal Sports Medicine*, 41, 558–561. doi: 10.1136/bjism.2006.032755.
- Linnan, L., Bowling, M., Childress, J., Lindsay, G. Blakey, C., Pronk, S. S. Wieker, S., & P. Royall (2008). Results of the 2004 National Worksite Health Promotion Survey. *American Journal of Public Health* 98(8), 1503–1509.
- Lopez, R. P., Hynes, P.H. (2006). Obesity, physical activity, and the urban environment: public health research needs. *Environmental Health*, 5(25), 1-10. doi: 10.1186/1476-069X-5-25
- MacDonald, P. S. (2001). Current approaches to phenomenology, *Inquiry*, 44, 101-124.

- Manis, I.A., Mansi, N., Shaker, H., & Banks, D. (2009). Stair Design in the United States and Obesity: The Need for a Change. *Southern Medical Association*, 102(6), 610-614. doi: 1097/SMJ.0b013e3181a4f67a
- Marrero, J., (2011, February 10). Region 5 Air and Radiation - Indoor Air Quality. Retrieved from <http://www.epa.gov>
- Martincigh L. (2003, May). *Attractiveness for pedestrians: a most fickle aspect of urban quality*. Paper presented at Fourth International Conference on Walking in the 21st Century, Portland OR. Abstract retrieved from <http://www.walk21.com/papers/Martinci.pdf>
- Mendes, E., (2010, February 9). Six in 10 Overweight or Obese in U.S., More in '09 than in '08 [Article]. Retrieved from <http://www.gallup.com>
- Miles, M.B. & Huberman, A.M. (1994). *Qualitative data analysis*. 2<sup>nd</sup> ed. Thousand Oaks, CA: Sage
- Morbidity and Mortality Weekly Report. (2009, June). Differences in Prevalence of Obesity Among Black, White and Hispanic Adults – United States, 2006-2008 (Weekly Report 58(27). Washington DC no author.
- National Council for Interior Design Qualification (2010). *About Interior Design*. Retrieved October 6, 2010 from: <http://ncidq.org/AboutUs/AboutInteriorDesign.aspx>
- Nicoll, G., & Zimring, C. (2009) Effect of Innovative Building Design on Physical Activity. *Journal of Public Health Policy*, 30, S111–S123.
- Oldenburg, B., Sallis, J. F., Harris, D., Owen, N. (2002). Checklist of Health Promotion Environments at Worksites (CHEW): Development and Measurements Characteristics *American Journal of Health Promotion*, 16(3), 288-299.
- Owen, N., Humpel, N., Leslie, E., Bauman, A., Sallis, J.F. (2004). Understanding Environmental Influences on Walking Review and Research Agenda. *American Journal of Preventive Medicine*, 27(1), 67-76. doi:10.1016/j.amepre.2004.03.006
- Paffenbarger, R.S., Hyde, R.T., Wing, A.L., & Hsieh, C.C. (1997). Physical activity, all-cause mortality, and longevity of college alumni. *New England Journal of Medicine*, 314, 605–13.
- Papas, M.A., Alberg, A.J., Ewing, R., Helzlsouer, K.J., Gary, T.L. & Klassen, A.C. (2007). The Built Environment and Obesity. *Epidemiologic Reviews*, 29, 129-143. doi: 10.1093/epirev/mxm009
- Pratt, C.A., Lemon, S.C., Fernandez, I.D., Goetzel, R., Beresford, S.A., French, S.A., Stevens, V.J., Vogt, T.M., & Webber, L.S. (2007). Design Characteristics of Worksite Environmental Interventions for Obesity Prevention. *Obesity*, 15(9), 2171-2180.
- Pronk, N.P., & Kottke, T.E. (2009). Physical activity promotion as a strategic corporate priority to improve worker health and business performance. *Preventive Medicine*, 49, 316–321 doi:10.1016/j.yjmed.2009.06.025
- Pucher, J. & Dijkstra, L. (2003). Promoting Safe Walking and Cycling to Improve Public Health: Lessons from the Netherlands and Germany. *American Journal of Public Health*, 93(9)1509–16.
- Rassia, S.T., Hay, S., Beresford, A., Baker, N.V. *Movement Dynamics in Office Environments, Proceedings of the 3rd CIB International Conference on Smart and Sustainable Built Environments (SASBE 2009)*

- Research Board, Institute of Medicine of the National Academies, Committee on Physical Activity, Health, Transportation, and Land Use, Transportation. (2005). *Does the built environment influence physical activity? Examining the Evidence* (Special report: 282). Retrieved from [http://www.trb.org/Main/Blurbs/Does\\_the\\_Built\\_Environment\\_Influence\\_Physical\\_Acti\\_155343.aspx](http://www.trb.org/Main/Blurbs/Does_the_Built_Environment_Influence_Physical_Acti_155343.aspx)
- Robert Wood Johnson Foundation – Trust for America’s Health. (2010, June). *F as in Fat, How Obesity Threatens America’s Future 2010*. [ISSUE REPORT]. Washington, DC: Levi, J., Vinter, S., St. Laurent, R., & Segal, L.M.
- Robroek, S.J.W., Tilja, I., van den Berg, J., Plat, J.F., Burdorf, A. (2011). The role of obesity and lifestyle behaviours in a productive workforce. *Occupational Environmental Medicine*, 68, 134-139. doi:10.1136/oem.2010.055962
- Saelens, B.E., Sallis, J.F., Frank, L.D., (2003) Environmental Correlates of Walking and Cycling: Findings from the Transportation, Urban Design, and Planning Literatures. *Environment and Physical Activity*, 25(2), 80-91.
- Sallis, J.F., Bauman, A., & M. Pratt, M. (1998). Environmental and Policy Interventions to Promote Physical Activity. *American Journal of Preventive Medicine*, 15, 379–97.
- Sallis, J.F., Cervero, R.B., Ascher, W., Henderson, K.A., Kraft, M.K. & Kerr, J. (2006). An Ecological Approach to Creating More Physically Active Communities. *Annual Review of Public Health*, 27, 297–322.
- Sallis, J. F. & Glanz, K., (2009). Physical Activity in food environments: Solutions to the Obesity Epidemic. *The Milbank Quarterly*, 87(1), 123–154.
- Sallis, J.F., & Kerr, J. (2006). Built Environment and Physical Activity. *PCPFS (President’s Council on Physical Fitness and Sports) Research Digest*, 7(4), 1–8.
- Sallis, J.F., Owen, N., & Fisher, E.B. (2008). Ecological Models of Health Behavior. In K. Glanz, B.K. Rimer, and K. Viswanath (Eds.), *Health Behavior and Health Education: Theory, Research, and Practice*, (pp. 465–486). San Francisco: Jossey-Bass.
- Stone, J, (2008 Summer). Designers are Motivators. *Perspective*. Retrieved from <http://www.iida.org>
- Strauss, A.L. & Corbin, J. (1990). Basics of qualitative research: Grounded theory procedures and practices. Newbury Park, CA: Sage
- Swinburn, B., Egger, G. & Raza, F. (1999). Dissecting Obesogenic Environments: The Development and Application of a Framework for Identifying and Prioritizing Environmental Interventions for Obesity. *Preventive Medicine*, 29, 563-570.
- Thaler, R.H., & Sunstein, C.R. (2008). *Nudge: Improving Decisions about Health, Wealth, and Happiness*. New Haven, Connecticut: Yale University Press.
- United States General Services Administration. (2010). *Facilities Standards for Public Building Service*. Retrieved from <http://www.gsa.gov>
- U. S. Environmental Protection Agency, (1997). *An office building occupant’s guide to indoor air quality*. Retrieved September 4, 2010, from: <http://www.epa.gov/iaq/pubs/index.html>

- Vastag, B. (2004). Obesity is now on Everyone's Plate. *Journal of American Medical Association*, 291(10), 1186-1188.
- Wells, N.M., Ashdown, S.P., Davies, E.H.S., Cowett, F.D., Yang, Y. (2007). *Environment, Design, and Obesity: Opportunities for Interdisciplinary Collaborative Research*. *Environment and Behavior*. Vol, 39(6). pp. 6-33. doi: 10.1177/0013916506295570.
- Willis, J. W. (2007). *Foundations of Qualitative Research: Interpretive and Critical Approaches*. Thousand Oaks, California: SAGE Publications, Inc.
- White, J. D. (1990). Phenomenology and organization development. *Public Administration Quarterly*, Spring, 76-85.
- World Health Organization, March 2011, [www.who.int](http://www.who.int), Fact Sheet no. 311  
<http://www.who.int/mediacentre/factsheets/fs311/en/>
- World Health Organization. (2004). *Global strategy on diet, physical activity and health*. (WHO Library Cataloging-in-Publication Data, NLM classification: QT 255). Retrieved from [http://www.who.int/dietphysicalactivity/strategy/eb11344/strategy\\_english\\_web.pdf](http://www.who.int/dietphysicalactivity/strategy/eb11344/strategy_english_web.pdf)
- Yancey, A.K., Pronk, N.P., & Cole, B.L. (2007). Workplace Approaches to Obesity Prevention. In S. Kumanyika, R.C. Brownson (Eds.), *Handbook of Obesity Prevention, A Resource for Health Professionals* (pp 317-347). doi: 10.1007/978-0-387-47860-9\_15
- Zimring, C., Joseph, A., Nicoll, G.L., & Tsepas, S. (2005). Influences of Building Design and Site Design on Physical Activity Research and Intervention Opportunities. *American Journal of Preventive Medicine* 28, 183-196 doi:10.1016/j.amepre.2004.10.025