UNDERSTANDING AND OVERCOMING BARRIERS IN UNHEALTHY SETTINGS: A PHENOMENOLOGICAL STUDY OF HEALTHY TRUCK DRIVERS

A Dissertation by

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Master of Arts, Wichita State University, 2012

Bachelor of Arts, Wichita State University, 2009

Submitted to the Department of Psychology
and the faculty of the Graduate School of
Wichita State University
in partial fulfillment of
the requirements for the degree of
Doctor of Psychology

December 2013

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A PHENOMENOLOGICAL STUDY OF HEALTHY TRUCK DRIVERS

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DEDICATION

To mom and dad, who always provided support and encouragement;
who always believed in where I was going,
even when I wasn't sure of the destination myself.

Adaptation is a profound process. Means you figure out how to thrive in the world.
-Adaptation

ACKNOWLEDGEMENTS

I would like to first extend my gratitude to Dr. Greg Meissen, my advisor and mentor. From our first encounter when I was a visiting applicant, I knew that my academic and professional development would flourish under his guidance, and those high expectations have even been exceeded. I owe much of what I have become, and am yet to become and accomplish, to him.

I would also like to extend my gratitude to my committee members: Dr. Michael Birzer, Dr. Alex Chaparro, Dr. Darwin Dorr, and Dr. Rhonda Lewis. Their support, interest, and input have guided this research endeavor in important ways, and their encouragement have stimulated my interest in research as a whole.

I am also grateful for the help and support of the other members of Dr. Greg Meissen's research team, the Community Research and Practice Collaborative, over the past year: Dr. Ashlee Lien, Dr. Sharon Hakim, Rosemary Wright, Heather Grohe, Dan Clifford, Jasmine Douglas, and Orlando Edwards. Whether giving feedback on proposal and defense presentations or assisting with the unglamorous work of transcription and being second coders, the assistance of these individuals has been invaluable.

Finally, I would like to thank the professional drivers who have taken the time out of their often exhausting and strenuous work and family schedules to avail themselves to being interviewed. I would especially like to thank Sandy Long, whose support for me, a stranger at the time, opened doors that would have been closed to me otherwise. I hope that I have done justice to the information and windows to experience that these individuals have given me.

ABSTRACT

In recent decades, obesity has grown in prevalence throughout the United States. Understanding why individuals engage in health-supportive behaviors is key in countering the obesity epidemic. Health promotion efforts guided by ecological theories of health behavior offer distinct advantages, and critical to these theories are settings. Increasingly, health promotion efforts target workplace settings, and, given the poor health outcomes of truck drivers, targeting truck driver workplace settings can be a vital leverage point in reducing obesity.

The present study utilizes a transcendental phenomenological approach to explore the phenomenon of being a healthy truck driver thriving in unhealthy workplace settings. Twelve interviews, averaging two hours in duration, were conducted with drivers who have been able to sustain lifestyles and health outcomes over extended periods of time. This study sought to uncover resiliency factors, perceived barriers, and workplace settings-level factors that should be changed; in addition, the essential, invariant structure of this phenomenon was derived.

Results identified seven broad themes: Access to health resources, barriers to health behaviors, recommended alternative settings, constituents of health behavior, motivation for health behaviors, attitude towards health behaviors, and trucking culture. Fifty-four subthemes were derived from these seven overall themes. The essential, invariant structure described the essence of the phenomenon in question and was validated through the process of member checking.

The findings of the present study suggest two ecological theories of health behavior which appear to most effectively encapsulate the phenomenon in question, and thus can guide health promotion efforts for truck drivers.

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CHAPTER 1

INTRODUCTION

The prevalence of obesity has grown in the United States in recent decades (Flegal, Carroll, Ogden, & Johnson, 2002). A recent report from the National Center of Health Statistics found that 35.7% of U.S. adults were obese in 2009-2010 (Ogden, Carroll, Kit, & Flegal, 2012). Obesity is associated with increased mortality ("The Surgeon General's call to action to prevent and decrease overweight and obesity," 2001). In addition to the human costs, obesity comes at a high monetary cost, with per capita annual medical expenditures 42% higher for obese individuals than those at a normal weight (Finkelstein, Trogdon, Cohen, & Dietz, 2009). Preventing and treating obesity is critical in maintaining and improving health and quality of life ("The Surgeon General's call to action to prevent and decrease overweight and obesity," 2001).

Understanding why people engage in health behaviors, particularly physical activity and healthy eating, is of vital importance in countering the obesity epidemic. There are many determinants of health, and ecological theories provide means to understand these determinants. Ecological theories and ecological models of health behavior are comprehensive, multi-level approaches that provide a framework for understanding complicated health behaviors, which involve multiple and interactive determinants; this framework considers the social, psychological, environmental, and policy contexts of health behavior, suggesting that health behavior and health outcomes can be improved by changing the environments in which people live (Cohen, Scribner, & Farley, 2000; Sallis, Owen, & Fisher, 2008). The emphasis on environment and setting is crucial, as addressing the context in which people make these health decisions is critical in achieving individual behavior change (Story, Kaphingst, Robinson-

O'Brien, & Glanz, 2008). Even if environmental influences on behavior are weak, they still have a widespread impact throughout the population every day (Booth et al., 2001).

The utility of a comprehensive understanding of health behavior determinants is that it can guide health promotion efforts designed to improve population-wide health. Many health promotion initiatives and interventions have been implemented in response to the obesity epidemic. Health promotion efforts are often criticized for this emphasis on individual lifestyle changes and ignoring contextual factors which impact health (Golden & Earp, 2012). As indicated by ecological models of health behavior, health promotion must be integrated into the settings and social systems which individuals interact with in their everyday lives (Dooris, 2012). These theories provide guidance for creating true health change across entire populations.

In terms of the obesity epidemic, health promotion efforts which involve environmental changes are usually most effective when they are accompanied with programs which encourage and assist people with engaging in physical activity and attaining healthy foods (Booth et al., 2001). One domain in which these programs have proliferated is in organizations, such workplaces. Workplace settings allow health promotion efforts to reach large numbers of adults of diverse socioeconomic and ethnic backgrounds, as well as individuals who would not normally be exposed to or involved in organized health promotion efforts (Goetzel & Ozminkowski, 2008; Pratt et al., 2007). Organizational settings allow for health promotion efforts to focus on distal factors that influence health, moving beyond a focus on the individual by providing a middle ground between individual health behavior and higher levels of influence, such as individuals' settings (Green, Poland, & Rootman, 2000).

The purpose of this research is to enhance understanding of settings-level influences on obesity-related health behaviors. As emphasized in ecological theories of health behavior,

settings are highly influential in the eating and physical activity behaviors. This is perhaps no more true than in the case of truck drivers, whose existence is inextricably tied to extreme obesogenic settings. Truckers are uniquely influenced by their workplaces because of the nature of the profession, and these workplaces are notorious for encouraging unhealthy behavior and presenting barriers to engaging in healthy eating and physical activity. Understanding the role of setting in health behaviors of truck drivers holds the potential not only to improve health promotion programs for professional drivers, but also to improve health promotion in other workplace settings, and even in non-occupational populations as well.

CHAPTER 2

LITERATURE REVIEW

Determinants of Health

The range and scope of factors that impact our health decisions are vast. Booth et al's (2001) framework of determinants of physical activity and eating behavior describes eight sets of determinants, ranging from proximal to distal (Figure 1). The psychobiological core consists of four items: Genetically programmed behavior and metabolism, behavioral and metabolic phenotypes as expressed within the individual's environment, psychological state, and current health status (Booth et al., 2001). Cultural determinants include inherited values and beliefs, as well as one's identity within his or her immediate environment (Booth et al., 2001). Societal determinants include the acquisition of values and beliefs, identity within the broader societal and cultural environment, broad societal values, roles, and relationships (Booth et al., 2001). Societal and cultural determinants interact; thus, the way that an individual is viewed by society affects how that individual views himself or herself (Booth et al., 2001). Enablers of choice are the factors that affect choice which are most proximal to the individual (Booth et al., 2001). Interventions most commonly focus on this set of determinants to initiate behavior change (Booth et al., 2001). Lifestyle determinants are the behavioral choices made by the individual (Booth et al., 2001). Behavior settings are the situational contexts in which behavioral choices are made, which include physical and social settings (Booth et al., 2001). Proximal leverage points are factors which affect both the structure and features of the individual's immediate environment (Booth et al., 2001). Finally, and most distally, distal leverage points are the factors which affect all behavior settings and broader environments, both directly and indirectly (Booth et al., 2001). These also include factors which affect all levels and impact attitudes, beliefs, and

knowledge, such as the media (Booth et al., 2001). This framework can be applied to understanding the many determinants of physical activity and eating behavior (Figure 2).

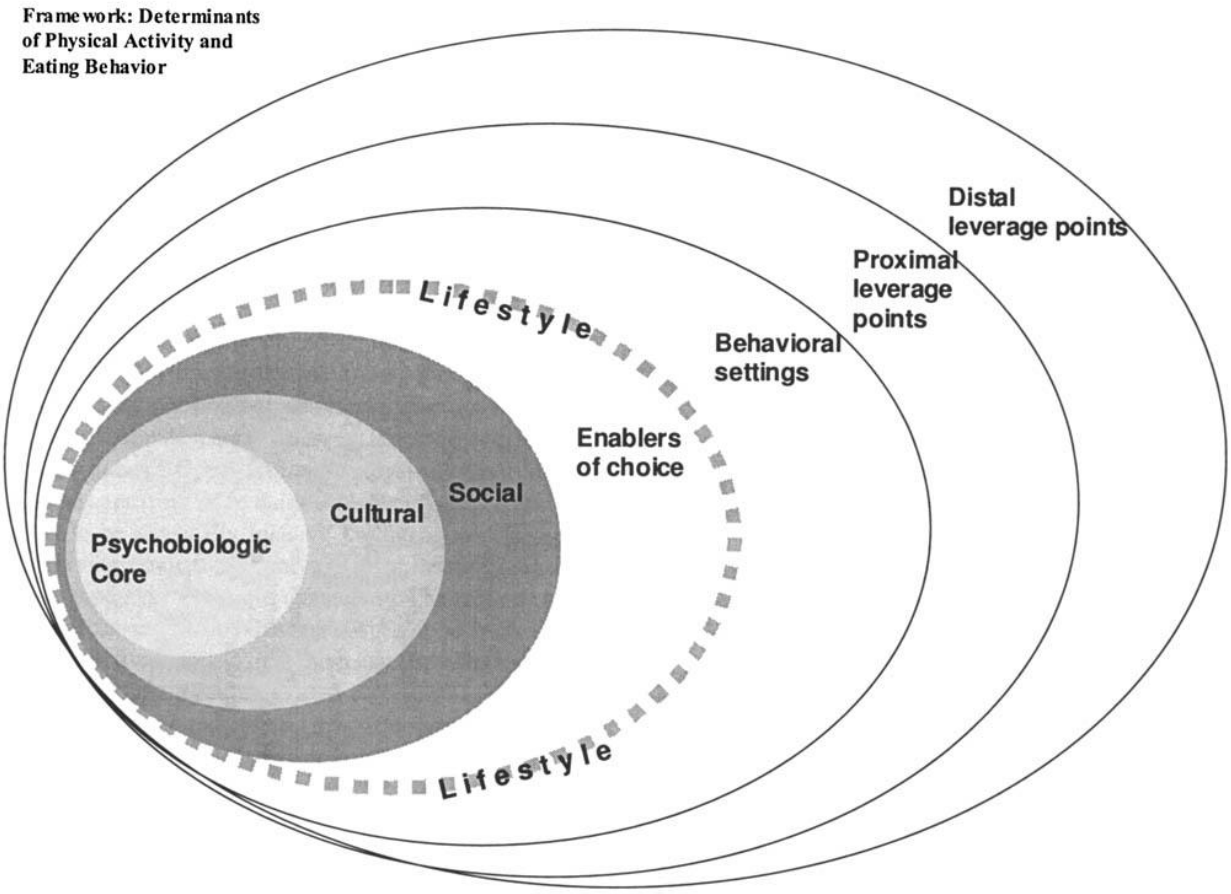

Figure 2.1. Layers of the framework for the determinants of behavior.

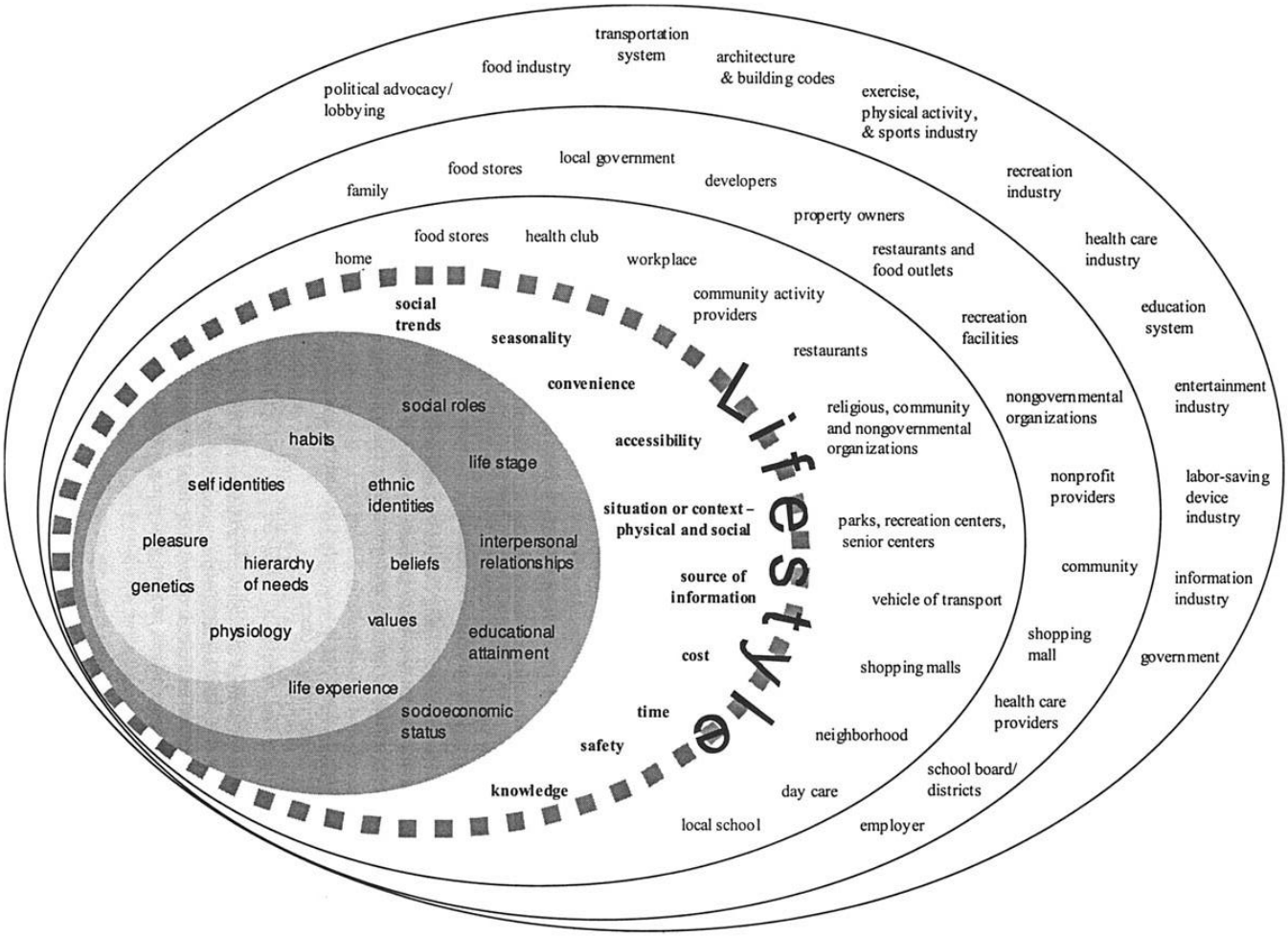

Figure 2.2. Framework for the determinants of eating and physical activity behavior.

Obesity may be viewed through an energy balance equation, in which there are two sides: Energy in, or dietary intake; and energy out, or basal metabolism and physical activity (Wells, Ashdown, Davies, Cowett, & Yang, 2007). An imbalance in this equation where there is a higher energy input than output leads to weight gain, and an imbalance in this equation where there is a higher energy output than input leads to weight loss (Wells et al., 2007). The physical environment, including the built environment, is particularly important in this equation because it may present either barriers or supports in relation to the energy balance equation (Figure 3). Barriers in the environment discourage individuals from eating healthy and from engaging in

physical activity, resulting in increased energy intake and decreased energy output (Wells et al., 2007). Conversely, environmental supports encourage eating healthy and engaging in physical activity, resulting in decreased energy intake and increased energy output (Wells et al., 2007). One important stipulation is that barriers and supports do not guarantee that individuals will engage in healthy behaviors or not; rather, barriers and supports make these behaviors more or less likely (Wells et al., 2007).

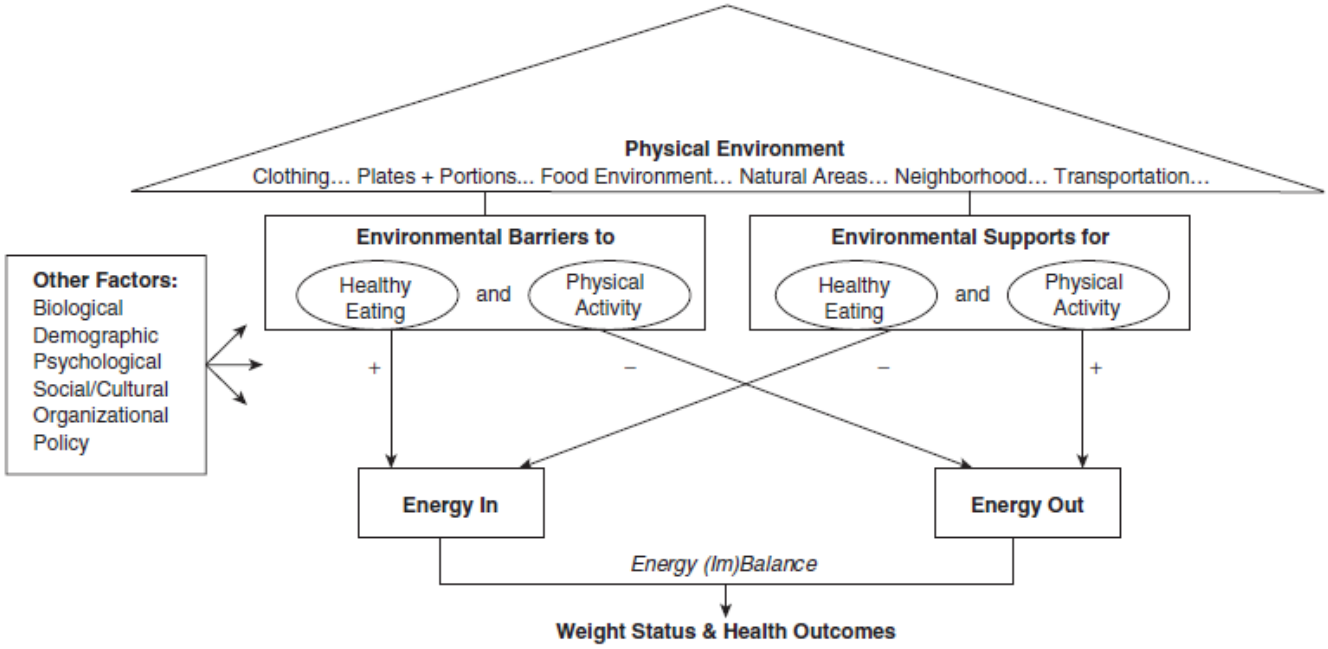

Figure 2.3. Conceptual framework of linkages between environment and health outcomes

Ecological Models of Health Behavior

Ecological models of health behavior attempt to understand health behavior by taking an ecological perspective, allowing researchers to view multiple levels, including the individual, social, and system levels, as well as the challenges and changes faced at each of these levels, in their synergistic and nested contexts (Peirson, Boydell, Ferguson, & Ferris, 2011). These models frame health as a product of the interdependence between individuals and subsystems of the ecosystem (Green et al., 2000). They are now mainstays in the field of public health; in addition,

there has been an increased emphasis in ecological model training and application in evaluation These models are based on the idea of multi-level influences on health behaviors, usually including the intrapersonal, interpersonal, organizational, community, physical, environmental, and policy levels as they guide comprehensive interventions (Sallis et al., 2008). This framework also allows for the integration of multiple theories (Sallis et al., 2008). A key strength of these models is that the emphasis on multiple levels of factors that influence health behavior means that there are more options for interventions (Sallis et al., 2008).

The term "ecology" refers to the relationships between organisms and their environments, and it has its origins in biology (Sallis et al., 2008). It was believed that perceptions of the environment were the only significant factor early in the developmental course of these theories; however, this belief has shifted over time, and now it is acknowledged that the environment directly affects health behavior (Sallis et al., 2008). As a testament to the robustness and adaptability of ecological models of health behavior, some of the more recent models are applicable to many different health behaviors, while others are tailored to more specific health behaviors (Sallis et al., 2008).

There has been a dramatic increase in the interest in ecological models of health behavior, as well as the application of these models in health behavior research and practice (Sallis et al., 2008). This trend has been reflected in public health programs that have been administered both nationally and internationally during this time, as well as the increased reliance on these models by health policy groups in addressing the most demanding health issues (Sallis et al., 2008). One of the major reasons for this is the promise they hold in reducing population-wide health problems through comprehensive approaches (Sallis et al., 2008). While many health behaviors are often seen as solely the responsibilities of the individuals in question,

ecological models shift some responsibility to organizational and community levels, emphasizing the need to address factors at these levels as well, addressing the interaction of individuals and settings (Sallis et al., 2008). Maximum behavior change is believed to take place when individuals' motivation and education, social norms and support, and environments and policies all support healthy choices (Sallis et al., 2008). Interventions that are based on such models target mechanisms of change at multiple levels of analysis (Sallis et al., 2008). When an intervention fails to take into account environmental factors and focuses on an individual factor, such as educating people to make healthy choices, any effects generated by this intervention will likely be temporary and weak (Sallis et al., 2008). Similarly, simply providing individuals the resources to make healthy decisions does not necessarily mean that these individuals will use the resources that are provided (Sallis et al., 2008). Only by addressing both individual and environmental factors that significant changes in health behaviors are likely; in particular, interventions that work through policy and environment to establish incentives and settings are able to create sustainable health behavior change (Sallis et al., 2008).

Principles of Ecological Models of Health Behavior

Ecological models of health behavior change are based on four principles. First, health behaviors are influenced by multiple levels of factors (Sallis et al., 2008). Second, factors at one level interact with factors at other levels, with variables working in conjunction (Sallis et al., 2008). The combination of multiple levels and multiple factors at each of these levels means it may be difficult to determine the importance of each interaction between factors (Sallis et al., 2008). Third, the most effective interventions are those that address multiple levels of influence (Sallis et al., 2008). Interventions that focus on only one or two levels of influence are not likely to have much of an effect (Flay & Petraitis, 1994). Fourth, ecological models of health behavior

are the most useful when they are behavior-specific, meaning that they are tailored to specific health behaviors (Sallis et al., 2008). What is learned from addressing one behavior may or may not translate to another behavior, even if the two behaviors appear to be similar (Sallis et al., 2008). Therefore, when applied to research and interventions, such behavior-specific models can be based on general ecologic models (Sallis et al., 2008).

Criticisms of Ecological Models of Health Behavior

Despite the numerous strengths associated with ecological models of health behavior, several weaknesses to these models have been identified. Perhaps the greatest weakness of these models is their lack of specificity. This can be attributed largely to their complexity (Green et al., 2000). In the case of general ecological models, they tend to be unspecific in regard to the most important influences on health behaviors; as a result, professionals must identify these influences when they attempt to apply these models (Sallis et al., 2008). There is also a lack of knowledge as to how factors interact across levels, as well as how exactly the broader levels of these models function (Sallis et al., 2008). Overall, these models broaden the perspectives of approaches to addressing health behaviors, but they lack guidance regarding specific variables or how they should be used in research or developing interventions (McLeroy, Bibeau, Steckler, & Glanz, 1988; Sallis et al., 2008). In contrast, individual-level psychosocial theories tend to better specify which variables and mechanisms influence health behavior (Sallis et al., 2008). Developing more sophisticated models is an important next step for the development of ecological models, as these would allow for more guidance for their use in interventions, as well as testable hypotheses (Sallis et al., 2008). Another weakness of ecological models of health behavior is the inconsistent empirical support for the hypothesized interactions between factors

across levels (Sallis et al., 2008). Addressing this weakness will likely lead to improved interventions using these models (Sallis et al., 2008).

Ecological models of health behavior also present methodological challenges. Researching these models is made difficult because of the nature of the hypothesized influences on health behavior. These models emphasize the complex interactions across multiple levels of influence (Sallis et al., 2008). An important goal of experimental designs is to isolate the effects of the intervention from the effects of its context, but this may oppose the principles of these models, which emphasize studying how the various components are indeed influenced by the context (Sallis et al., 2008). Overcoming this challenge may rely on having sufficient numbers of research participants for multi-level analyses, as this would allow for estimating the effect of intervention components on outcomes, while also providing an estimate of how much these effects were influenced by moderating factors (Sallis et al., 2008). Ecological models have been criticized for failing to produce testable hypotheses (Green et al., 2000). A positivist approach would require that these systems be simplified, which would be an artificial representation of these complex systems (Green et al., 2000). Furthermore, traditional forms of evaluation do not work as well using ecological approaches: Not only are the units of analysis not amenable to random assignment, but investigators have little control in manipulating independent variables (Green et al., 2000). Finally, in ecological approaches the level of analysis is dependent on the observer (Green et al., 2000). Both the system as a whole and each subsystem must be analyzed to capture system-subsystem relationships (Green et al., 2000). Because each system which one may analyze is itself a subsystem of a larger system, a subjective decision must be made about what to include what to include and not include in the analysis (Green et al., 2000). Also,

systems are dynamic, making the analysis time-dependent (Green et al., 2000). These two issues limit the generalizability of an intervention (Green et al., 2000).

In addition to methodological challenges, ecological models of health behavior present logistic challenges as well. For one, research based on these models is more demanding than research that only focuses on one level (Sallis et al., 2008). Implementing interventions based on these models is more difficult as well. For one, the amount of time to change policies and environments may serve as a deterrent to program directors, who are often working within shorter timelines prescribed by grants or legislators (Sallis et al., 2008). Also, many environmental variables and relevant policies are not controlled by health professionals, and making the desired changes requires health professionals to either become skilled in advocacy and political maneuvering or work with partners who have these skills (Sallis et al., 2008). The sophistication of these approaches may deter health promotion practitioners from taking action, as the complex interactions and influences across levels are difficult to comprehend and control (Green et al., 2000). Not only does this create difficulties in setting priorities, but they also generate questions which are difficult to answer, including how much is enough to make a difference, have they gone deeply enough to the root of the problem, and is everything that addresses the individual level insignificant or misguided (Green et al., 2000)? Despite the logistical challenges, studies based on ecological models are the only way to generate understanding that will allow for more effective multi-level interventions (Sallis et al., 2008).

One final set of criticisms of ecological models of health behavior are based around ethical issues. Because these models shift the focus of health behavior change away from individual responsibility only and instead implicate an array of factors, several arguments may arise (Sallis et al., 2008). Some may argue that these models are robbing individuals of their

dignity by shifting the focus away from exclusive individual responsibility, while others may argue that these models are engaging in a form of victim blaming by removing excessive responsibility from the individual (Sallis et al., 2008). However, ecological models hold the promise of actually enhancing human dignity by shifting explanations for behavior exclusively within the purview of the individual, distributing responsibility and influence to include both the individual as well as many levels of external influence (Sallis et al., 2008). One way to minimize problems of paternalism is to actively involve the target population of health promotion efforts in the process, from defining the problem, to selecting the targets of change, and to developing, implementing, and evaluating the program (McLeroy et al., 1988).

Implications of Ecological Approaches for Health Promotion Practice

Current understandings of ecological approaches to health behavior imply several important lessons for health promotion practitioners. First, interventions may have unanticipated effects, as the consequences of these interventions may extend beyond the setting in which they are implemented and create second- and third-order consequences (Green et al., 2000). A second implication of ecological approaches for health promotion practice is based on reciprocal determinism, which states that the individual and their environment interact, mediating the functioning of individuals (Green et al., 2000). This means that the environment impacts the behaviors that occur within it, and changing environmental factors modifies these behaviors; in addition, behavior influences the environment in which it occurs, and individuals can be empowered to control the environmental and behavioral factors which impact their health (Green et al., 2000). Third, environmental specificity states that no one health promotion approach is inherently superior (Green et al., 2000). Finally, interventions need to be multi-level and multi-sectoral, addressing several levels and multiple sectors of a system (Green et al., 2000).

Early Ecological Models

Ecological Psychology

Kurt Lewin's ecological model focused on the relationship between the individual and his/her environment. He described behavior (*B*) as a function (*F*) of the person (*P*) and his environment (*E*); in other words, $B = F(P , E)$ (Lewin & Cartwright, 1951). In this model, the person and environment are not independent of each other, and the state of the person depends on his/her environment; therefore, $E = F (P)$, and $P = F (E)$ (Lewin & Cartwright, 1951). According to Lewin, understanding or predicting behavior demands that we consider the person and environment as one set of interdependent factors, and he referred to this set of factors as the life space (*LSp*); in equation form, $B = F(P , E) = F (LSp)$ (1951). The life space is the individual and the psychological environment as it exists for that individual, with factors that do not affect the life space of that individual not included as a part of the psychological field (Lewin & Cartwright, 1951). The sum of the mutually independent, coexisting factors is known as a field, and the life space is viewed as one field (Lewin & Cartwright, 1951). All behaviors are considered to be a change in some state of a field during a period of time, and the explaining or predicting of any behavior requires linking that change with the conditions of the field at that time (Lewin & Cartwright, 1951).

In this model, behaviors are conceived of as the result of forces in the individual, the life space, the group, and its setting (Lewin & Cartwright, 1951). Explaining behavior requires two processes: Representing the life space scientifically, and determining which function links the behavior to the life space (Lewin & Cartwright, 1951). Lewin identifies five general points in using this model to explain behavior. First, the field must be represented as it exists for the individual at that particular time (Lewin & Cartwright, 1951). Second, the social aspect of the

psychological is as important or even more important as the physical aspect (Lewin & Cartwright, 1951). Third, a characterization of the psychological environment must take into account factors such as the atmosphere, amount of freedom, goals, stimuli, needs, and social relationships (Lewin & Cartwright, 1951). Fourth, a representation of the field that exists for an individual at a particular time must include all factors that affect behavior, and only the factors that can affect behavior are part of the individual's field (Lewin & Cartwright, 1951). Finally, the field can be expressed mathematically as the interrelation of its parts, and thus does not require what the "essence" behind the field is (Lewin & Cartwright, 1951).

Environmental Psychology

Roger Barker's approach was influenced by the work of Kurt Lewin, particularly in regards to elements of the psychological environment, and his earlier work focused primarily on the individual (Moos, 1980). The behavior of an individual in a single moment is determined by his life-space (a Lewin term), but knowledge of the ecological environment is necessary to understand the course of the life space; in other words, one must understand the ecological environment to understand development (Barker, 1968). Barker believed that separate description and measurement of environment and behavior was necessary to study the relationship between the two (1968). In his view, the environment consists of structured arrangements of objects and events which bring about behavior, and describing this structure cannot be accomplished by only examining a single part or each part separately; in addition, the environment had dynamic attributes as well (Barker, 1968).

In his later work, Barker shifted his focus from the individual to behavior settings (Moos, 1980). This was referred to as behavioral ecology, which is focused on molar behavior and, more specifically, the molar environment: Locations are bounded, physically and temporally, and

stable with varied patterns of groups of people and their behavior (1968). A genotype is a category for equivalent behavior settings (Barker, 1968). A behavior setting consists of one or more standing patterns of behavior-and-milieu, and these patterns persist even when the setting inhabitants change (Barker, 1968). The milieu of a behavior setting exists independently of both the perceptions of individuals in a setting and of the standing pattern of behavior (Barker, 1968). The milieu in a behavior setting is circumjacent, or surrounding, the standing pattern of behavior (Barker, 1968). For example, in the case of a store, However, milieu is synomorphic of behavior, meaning that they are similar in structure, and the synomorphs within a behavior setting are interdependent among themselves to a greater degree than they are to synomorphs in other behavior settings (Barker, 1968). This interdependence is a component internal unity, a fundamental property of a behavior setting (Barker, 1968).

Also essential to the internal unity of behavior settings are their homeostatic regulatory stems, which ensure that inhabitants conform to the standing patterns of behavior within that setting (Barker, 1968). The inhabitants of a behavior setting actually exhibit the most variation and perform the most varied functions of any of the components of a behavior setting; indeed, this is particularly true for understaffed settings, where there are fewer than optimal inhabitants and thus inhabitants perform an even greater variety of functions and are even more active (Barker, 1968). Even in the case of understaffed settings, the standing pattern of behavior do not change, except for where there are so few inhabitants that the setting actually transforms into a different setting (Barker, 1968). Barker identified four circuits through which the standing patterns of behavior are maintained despite changes in setting inhabitants: Goal circuits, program circuits, deviation-countering circuits, and vetoing circuits (Barker, 1968). Goal circuits are the routes to goals that inhabitants follow, program circuits are the programs of eco-behavioral

occurrences, deviation-countering circuits counter deviant behavior, and vetoing circuits eliminate deviant behavior (Barker, 1968). Barker's behavior settings theory was an important step in understanding the psychology of behavior in a way that is different from a person-centered or intrapsychic approach (Luke, Rappaport, & Seidman, 2002).

Ecology of Human Development

Bronfenbrenner developed his ecological model to describe human development, which emphasized the developing person, the environment, and, in particular, the interaction between person and environment (1979). The interaction between person and environment is considered to be bi-directional and based on reciprocity (Bronfenbrenner, 1979). He defined development as "the person's evolving conception of the ecological environment, and his relation to it, as well as the person's growing capacity to discover, sustain, or alter its properties" (Bronfenbrenner, 1979). In his view, the environment extends beyond the behavior of individuals to include modifiable and expandable systems both within and between settings (Bronfenbrenner, 1979). In this model, the ecological environment as a set of four nested structures, each one inside the next, with the developing person at the inner-most level (Bronfenbrenner, 1979). These four nested structures were labeled microsystems, mesosystems, exosystems, and macrosystems. The microsystem consists of the pattern of activities, roles, and interpersonal relationships within the immediate setting containing the individual and the complex of interrelations within that setting; the mesosystem consists of settings in which the developing person participates and the relationships between them; the exosystem consists of settings that the individual may not actually participate in but in which events take place that may profoundly affect his or her immediate environment; and the macrosystem consists of generalized patterns of ideology and social institutions that are common to the individual's culture or subculture (Bronfenbrenner,

1979). Conducting ecological research from this perspective requires that the properties of the individual and the environment, the structure of the setting, and processes occurring both between and within settings must be considered interdependent and analyzed in systems terms; furthermore, interactions are likely to be the principal main effects in this type of research (Bronfenbrenner, 1979).

A phenomenological perspective is critical to Bronfenbrenner's theory. For example, a fundamental aspect of the microsystem is the idea of how it is experienced by the individual (Bronfenbrenner, 1979). The phenomenological perspective is also relevant at the other three levels (Bronfenbrenner, 1979). Also important to this theory are the concepts of ecological transition, ecological validity, phenomenological validity, developmental validity, and transforming experiment (Bronfenbrenner, 1979). An ecological transition is when a change in role, setting, or both changes an individual's position in the ecological environment (Bronfenbrenner, 1979). Ecological validity refers to the extent to which the properties of the ecological environment as described by the researcher match the environment actually experienced by the individual in the setting (Bronfenbrenner, 1979). One aspect of ecological validity is phenomenological validity, which refers to the degree of correspondence between the subject's and researcher's view of a research setting (Bronfenbrenner, 1979). Developmental validity refers to the extent that a change produced in an individual, such as conceptions or activities, extends to other settings and times (Bronfenbrenner, 1979). Finally, transforming experiments involve changing ecological systems systematically in ways that challenge characteristics of macrosystems, such as belief systems, social organization, and lifestyles within a culture or subculture (Bronfenbrenner, 1979). Changing the structure of settings in society at

the macrosystem level, such as by changing public policy, initiates changes in behavior and development of individuals (Bronfenbrenner, 1979).

Social Ecology

The social ecological approach introduced by Rudolph Moos emphasized social-environmental and physical environmental variables in conceptualizing the interactions between people and their environments and the impact of these interactions on the functioning of individuals (1980). Moos believed that identifying basic dimensions of an individual's environment can be used to identify useful settings in which to intervene; in addition, he points several possible avenues for interventions to improve health which do not require a major overhaul of the physical environment, such as providing information to increase the sense of control over the environment and the reactions to it of individuals, as well as changing the social climate by improving social cohesion and social support (1980). One particularly useful way to evaluate settings according to Moos is to focus on how people successfully cope with stressful environments and transcend environmental pressure (1980).

Moos conceptualized four major groups of environmental variables, each of which can influence health outcomes either indirectly through the other groups or directly: Physical setting variables include physical design, architectural, geographic, and meteorological characteristics; organizational factors; human aggregate factors, which are related to characteristics of setting inhabitants, such as age, ability, socioeconomic background, and educational attainment; and social climate variables, which involve the climate or atmosphere of a setting (1980). Social climate variables are further divided into three categories: Relationship, personal growth or goal orientation, and system maintenance and system change (Moos, 1980). Relationship variables are the extent to which individuals are involved in the environment, support one another, and

express themselves (Moos, 1980). Personal growth or goal orientation variables refer to the directions along which personal development occur within the environment (Moos, 1980). Finally, system maintenance and system change variables are the extent to which the environment responds to change, maintains control, provides clear expectations, and is organized (Moos, 1980).

Relevant personal variables explain individual differences in responses to various environments and may include a wide variety of background and personal characteristics, including age, socioeconomic status, intelligence, self-esteem, ego strength, previous coping experiences, cognitive and emotional development, attitudes, values, traits, and roles (Moos, 1980). These variables also can affect the individual resources available to handle a particular environment (Moos, 1980). An individual's expectations of what an environment will be like can influence his choices, as well as his later perceptions of this environment; hence, an individual's expectations are another relevant personal variable (Moos, 1980).

The social ecological model identifies three sets of mediating factors: Appraisal, activation, and adaptation (Moos, 1980). It is usually not possible to relate an objective environmental or individual variable with a health-related outcome variable (Moos, 1980). Appraisal is the way that an environment is perceived, and although environmental and personal factors can affect individuals directly, appraisal is often a critical mediating factor (Moos, 1980). Following an appraisal that determines that an environment requires a response, activation occurs (Moos, 1980). Activation is followed by adaptation, which may result in changing environmental or individual factors (Moos, 1980).

Moos's social ecological model is based largely on health outcomes, and the final part of the model refers to health status and health-related behavior (1980). He divides related variables

into five groups: 1) the onset and development of illness; 2) the course of illness and treatment outcomes; 3) the utilization of health services and treatment compliance; 4) effectiveness; and 5) well-being and satisfaction (Moos, 1980).

Modern Ecological Models of Health Behavior

Newer ecological models differ from older systems models in that they view patterns of behavior, whether of individuals or in aggregate form, as the outcomes of interest (McLeroy et al., 1988). Modern ecological models of health behavior focus on the effects of social environments on the individual, which occur probabilistically; how this effects intra-individual functioning, such as within organs, cells, at the sub-cellular level, and at the molecular level; and how these all feed back to the social environment (Glass & McAtee, 2006).

Ecological Model of Health Behavior

The ecological model of health behavior posited by McLeroy and colleagues focuses on both individual and social environmental factors in promoting health, with an emphasis on changing social environmental factors at the interpersonal, organizational, community, and public policy levels through health promotion interventions (1988). A key assumption in this model is that individual health behaviors will change as the result of changing the social environment (McLeroy et al., 1988). Changing the social environment requires the support of the population in these environments (McLeroy et al., 1988). In this model, the outcome if interest is patterns of health behavior, and there are five determinants of health behavior that reflect the range of strategies that are available for health promotion interventions: Intrapersonal factors, interpersonal factors, institutional factors, community factors, and public policy (McLeroy et al., 1988). As our understanding of health behavior changes, other levels of analysis may be possible (McLeroy et al., 1988).

Intrapersonal factors include individual characteristics such as knowledge, attitudes, behavior, self-concept, and skills (McLeroy et al., 1988). Interventions that are targeted at intrapersonal determinants of health behavior often implicitly assume that the proximal causes of health behavior and the mechanisms for producing change in behavior are within the individual and not in the social environment (McLeroy et al., 1988). Addressing intrapersonal factors often involves psychological theories, and when these are applied to changing health behaviors physiological processes or interpersonal influences may be involved (McLeroy et al., 1988). Interventions that address the intrapersonal level may use a variety of strategies or a variety of levels, and may attempt to modify the impact of social influences; however, the theory of change centers on changing the characteristics of an individual or intentions to comply with behavior norms (McLeroy et al., 1988).

Interpersonal factors are centered on the influences of social network and social support systems, such as family, neighbors, co-workers, acquaintances, and friends, on the health behaviors of individuals (McLeroy et al., 1988). Social networks consist of individuals who share linkages, and individuals belong to one or more social networks (McLeroy et al., 1988). Social networks vary in structure and function (McLeroy et al., 1988). In terms of structure, some networks are homogenous and some are heterogeneous, some networks have individuals that share multiple linkages while others are more loose, and some networks have members where all members are connected to each other while others are less well connected (McLeroy et al., 1988). An individual's social networks are essential to his or her social identity (McLeroy et al., 1988). Social networks influence the behaviors of those with linkages to the network, as well as those people who are not linked to the network (McLeroy et al., 1988). Health promotion interventions typically have not attempted to change the norms of the social groups to which

individuals belong; instead, they usually try to change individuals through social influences (McLeroy et al., 1988). Interventions targeting the interpersonal level should change the nature of an individual's social relationships, particularly those whose influence serves to promote unhealthy behaviors (McLeroy et al., 1988).

Organizational factors consist of characteristics of organizations and social institutions, as well as formal and informal rules and regulations (McLeroy et al., 1988). Organizational settings have a major influence on health behaviors because people spend so much of their lives in these settings (McLeroy et al., 1988). Organizations provide social and economic resources to individuals; in addition, memberships to organizations are an important part of social identity (McLeroy et al., 1988). Organizations may have positive or negative effects on the health of individuals, and many of the characteristics of an organization can be used to support health promotion, particularly at worksites (McLeroy et al., 1988). Interventions targeted at the organizational level look at how the characteristics of organizations can support behavior change, how important organizational change is for health behavior change, and the importance of the context of an organization in implementing health promotion programs (McLeroy et al., 1988). Worksite interventions have typically targeted employees and not the organization itself: Targeting the organizations themselves may require taking on an organizational development role and connecting with other health-related efforts within the organization (McLeroy et al., 1988). Often times these interventions strive to change the corporate culture, thrusting health outcomes as factors in organizational decision making and making health-related values and norms a part of the corporate ideology (McLeroy et al., 1988). Organizational changes are needed for long-term behavior change of individuals, as well as for creating a health-supportive

corporate culture and for the adoption, implementation, and institutionalization of health promotion programs (McLeroy et al., 1988).

Community factors are comprised of the relationships that exist among organizations, institutions, and informal networks within defined boundaries (McLeroy et al., 1988). In this model of health behavior, community has three meanings, each of which has different implications for health promotion efforts (McLeroy et al., 1988). The first meaning refers to mediating structures, which are the primary groups to which an individual belongs such as their families, friends, and neighborhoods (McLeroy et al., 1988). These may be important sources of social resources and identity; in addition, these structures may contain and influence the larger communities' norms and values, individuals' beliefs and attitudes, and other health behaviors (McLeroy et al., 1988). Changing the health behaviors of individuals may be difficult without the support of these mediating structures (McLeroy et al., 1988). These structures can be used by health promotion programs to deliver services to a community or to strengthen organizations that already exist within neighborhoods (McLeroy et al., 1988). The second meaning of community refers to the relationships between organizations and groups within a certain area (McLeroy et al., 1988). Health promotion programs are generally delivered through existing community organizations; therefore, the relationship between the organization that hosts the program and other community agencies is critical (McLeroy et al., 1988). Promoting health behavior at a community level may mean increasing coordination between community agencies and coalition building (McLeroy et al., 1988). The third meaning refers to an area defined geographically and politically (McLeroy et al., 1988). This meaning of community is focused on issues of power, and power structures within communities at various levels often play a key role in defining what the health problems are within communities and how resources are allocated

(McLeroy et al., 1988). The ramifications of health promotion programs for those within the community who have power are often overlooked by those planning and conducting these programs, which may result in the failure of these programs because those with power see these programs as threats to their interests and actively or passively block them (McLeroy et al., 1988). Also important are those who have little access to power, those who are considered hard to reach (McLeroy et al., 1988). These are usually the people with the most severe health problems; unfortunately, their problems limit their ability to participate in community structures and activities, and as a result they end up being left out of the process of defining and creating solutions to community health problems (McLeroy et al., 1988). Health promotion programs must reduce the isolation of these hard to reach individuals by increasing their access to the larger political and power structures in their communities (McLeroy et al., 1988).

Public policy consists of policies and laws at the local, state, and national levels (McLeroy et al., 1988). Public policy development, advocacy, and analysis are important for communities (McLeroy et al., 1988). The mediating structures within communities serve as connections between individuals and broader social environment; therefore, they are sites of access to and influence on the policy-making process (McLeroy et al., 1988). Health promotion efforts may be based on strengthening the ability of these mediating structures to influence policy (McLeroy et al., 1988).

Social Ecology Model

In the view of the social ecology model, health promotion efforts that are multifaceted, include complementary individual and environmental components, extend across multiple settings, and incorporate multiple levels of analysis are more likely to be successful than more narrow efforts (Stokols, 1992). Inherently interdisciplinary, the social ecology model addresses

multiple levels of analysis and multiple methodologies in assessing health (Stokols, 1992). Compared to earlier ecological models, this model focuses more on the contexts of people-environment interactions, viewing health promotion as a dynamic transaction between people and their social and physical milieus (Stokols, 1992). Personal factors that are relevant to health include those that are biological, genetic, and psychological, as well as behavioral processes (Stokols, 1992). Health-relevant environmental factors involve natural, artificial, and sociocultural features and include geographical, architectural, and technological, as well as sociocultural processes, such as cultural, socio-structural, economic, legal, and political processes (Stokols, 1992). A basic assumption is that health is multifaceted and includes physical health, emotional well-being, and social cohesion (Stokols, 1992). The social ecology model is based on four additional core assumptions regarding human health and the development of strategies to promote health and well-being (Stokols, 1992).

First, the health of individuals and an environment is influenced by multiple facets of the physical and social environment, as well as personal attributes (Stokols, 1992). The physical environment includes characteristics such as geography, architecture, and technology; the social environment includes characteristics such as culture, economics, and politics; and personal attributes include characteristics such as genetics, psychological dispositions, and patterns of behavior (Stokols, 1992). Because of the multifactorial influences on health, health promotion efforts should be based on the interplay between these influences and not on any one set of factors exclusively (Stokols, 1992). Second, health promotion efforts should address the complex and multidimensional nature of environments (Stokols, 1992). Third, individuals within environments can be studied at many different levels, from the individual-level to the population-level (Stokols, 1992). Fourth, the social ecology model incorporates several concepts

from systems theory, including interdependence, homeostasis, negative feedback, and deviation amplification, in understanding how people and their environments interact (Stokols, 1992). Environments are viewed as complex systems, the interactions between individuals and their environments are described using cycles of mutual influence, and health promotion must take into account interdependencies between proximal and more distal environments (Stokols, 1992).

The social ecology model identifies five functions of the environment that are related to health. First, it can function as a medium for disease transmission (Stokols, 1992). Second, the environment can serve as a stressor (Stokols, 1992). It can also enable health behavior (Stokols, 1992). Fourth, the environment can be a source of safety or danger (Stokols, 1992). Finally, the environment can provide resources for health (Stokols, 1992). These various functions are intertwined and can operate simultaneously in any specific environmental context (Stokols, 1992).

The environment can influence health in several different ways; therefore, the capacity of an environment to promote health must be defined in regards to the many health outcomes that may result over a specified period of time that result from the interactions between individuals and the environment (Stokols, 1992). Health promotion efforts should be broadly based and take into consideration the diverse set of resources that are available in a particular area (Stokols, 1992). Therefore, it is important to identify which resources or constraints within the environment are likely to influence health among individuals for any environmental context of behavior (Stokols, 1992). Aspects of the environment that are relevant to health may range in scale, from specific stimuli to complex domains (Stokols, 1992). Health outcomes must be differentiated based on criteria such as severity, duration, and importance to individuals in that setting (Stokols, 1992). Determining which health outcomes are most important to setting

inhabitants is particularly important because many environments result in both positive and negative health outcomes, some of which are significant and some are not; hence, how supportive an environment is to health depends on its ability to support the health outcomes that are the most important to setting inhabitants while removing those that are the most negative (Stokols, 1992). Unfortunately, determining which outcomes are the most important is difficult because often times they may vary depending on the level of analysis (Stokols, 1992).

An important issue that must be dealt with in health promotion research is determining the appropriate contextual scope. Stokols (1996) identifies three types of scope: Spatial, temporal, and sociocultural. As the contextual scope widens, analysis of how environments impact health becomes increasingly complex (Stokols, 1992). Another important issue is distinguishing between the immediate and potential capacity of a setting to promote health (Stokols, 1992).

Theory of Triadic Influence

The Theory of Triadic Influence (TTI) (Figure 4) integrates multiple micro theories of health behaviors and provides new insights in understanding both new and regular health behaviors (Flay & Petraitis, 1994). It is an attempt to understand and simplify the complexity of health behaviors, offering a comprehensive understanding of the causes of these behaviors and providing practical guidance in how to change them (Flay & Petraitis, 1994). In the view of Flay & Petraitis, there are three causes of behavior: The cultural environment, the current social situation, and individual characteristics (1994). Fully understanding behavior requires an analysis that integrates environmental, situational, and individual factors, as well as the behavior itself, closely related behaviors, and the interactions between all these elements (Flay & Petraitis,

1994). The behaviorally relevant factors accounted for in the TTI may have direct or indirect effects on behavior (Flay & Petraitis, 1994).

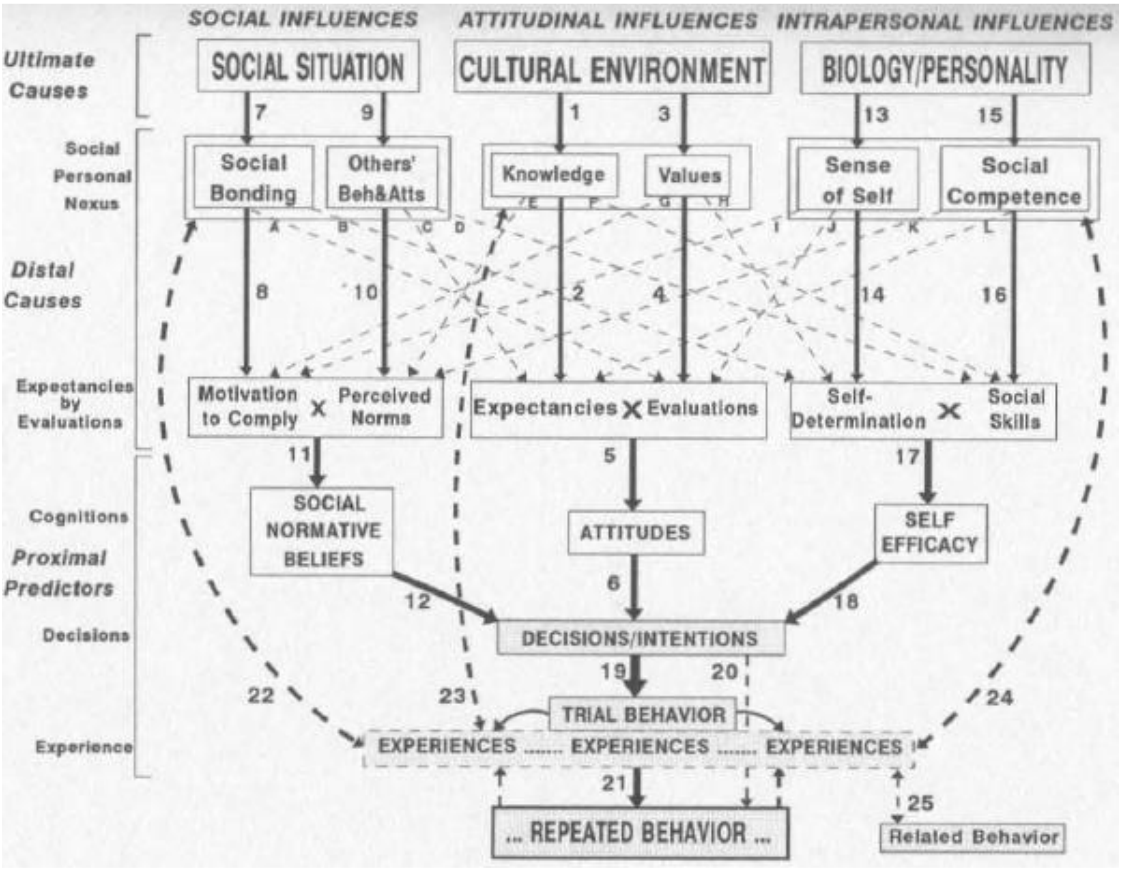

Figure 2.4. The Theory of Triadic Influence.

In the TTI, health behavior is most proximally controlled by the decisions of the individual, and these decisions are a function of attitude towards the health behavior, the pressure of social norms on performing the health behavior, and the individual's self-efficacy in performing the health behavior (Flay & Petraitis, 1994). Attitudinal, social, and intrapersonal influences impact health decisions both independently and in a combined manner (Flay & Petraitis, 1994). They are considered to be the three "streams of influence" in the TTI, which have different origins and "flow" through different factors (Figure 5) (Flay & Petraitis, 1994).

Attitudinal influences flow through factors that impact values, knowledge, expectations, and evaluations of the consequences of health behaviors; these influences have their origins in the cultural environment (Flay & Petraitis, 1994). Social influences flow through factors that affect social norms related to health behaviors, and these influences originate in the current social situation of the individual (Flay & Petraitis, 1994). Finally, intrapersonal influences flow through health-related self-efficacy and originate in the personality and dispositions of the individual (Flay & Petraitis, 1994).

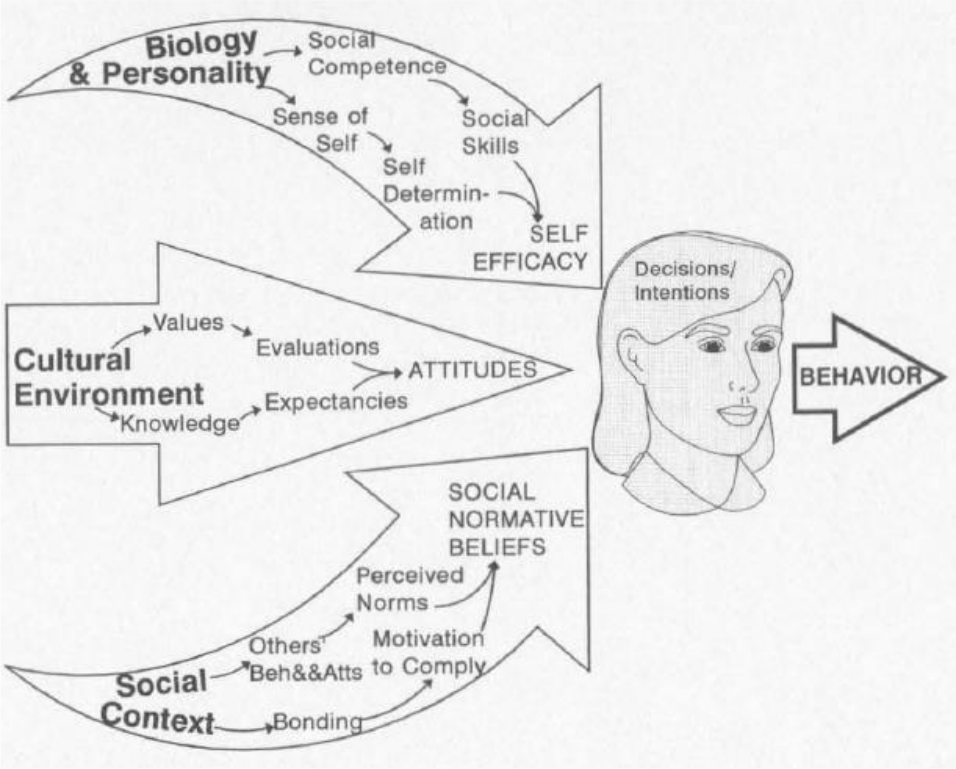

Figure 2.5. The three streams of influence on health-related behavior.

Each of the three streams of influence flows through five levels of influence, or "tiers" (Flay & Petraitis, 1994). Proximal factors are highly predictive but scarcely explain the root causes of behaviors (Flay & Petraitis, 1994). Distal factors explain less immediate causes of health behaviors (Flay & Petraitis, 1994). Ultimate causes are exogenous and constitute major determinants of health behavior, existing beyond the immediate control of individuals (Flay &

Petraitis, 1994). Ultimate causes are less predictive but more deeply rooted than more proximal factors; furthermore, they are usually change little over time for populations and are difficult to manipulate experimentally (Flay & Petraitis, 1994). The top tier consists of the ultimate causes of the health behavior, which is the socio-cultural context (Flay & Petraitis, 1994). Factors included at this level are inherited traits, personality dispositions, sociocultural heritage, the macro-environment, and micro-environments (Flay & Petraitis, 1994). These causes are the deep-seeded and root causes of behavior (Flay & Petraitis, 1994). As the socio-cultural context changes over time, the effectiveness of interventions will also change (Flay & Petraitis, 1994). Below this are more intermediate levels of influence, such as what individuals extract from their personal characteristics, situations, and environment; the expectations of the health behavior and the evaluation of the expectations of the health behavior of the individual; and the health-related cognitions of the individual (Flay & Petraitis, 1994). The second tier is called the social-person nexus tier, which is where the ultimate causes of behavior interact, creating general but personally relevant social relationships, knowledge, values, sense of self, and sense of social competence (Flay & Petraitis, 1994). The third tier is called the expectancy-value tier, which is where the properties of the second tier become more specific to the actual health behavior that is being examined (Flay & Petraitis, 1994). The fourth tier is the cognitive tier and consists of social normative beliefs, attitudes, and self-efficacy (Flay & Petraitis, 1994). The cognitions at this tier determine the fifth tier: The decision or intention to act in a certain way, given a particular situation (Flay & Petraitis, 1994). This lowest tier is the most proximal to the health behavior and consists of the decisions and intentions of the individual (Flay & Petraitis, 1994). There are inter-stream effects, as well as influences that flow between the tiers (Flay & Petraitis, 1994). In addition, feedback loops, which are influenced by experiences with related health

behaviors and preliminary experiences with new health behaviors, exist through all three stream of influence that add to the influence of these streams (Flay & Petraitis, 1994).

The tiers for the attitudinal stream of influence are shown in Figure 6. Health-related attitudes ultimately contribute to health behavior decisions (Flay & Petraitis, 1994). Socio-cultural factors indirectly contribute to health-related beliefs and attitudes by directly influencing health-related knowledge, values, expectations, and evaluations (Flay & Petraitis, 1994). The socio-cultural environment provides information through schools, the media, and people that individuals have limited personal contact with that contributes to the individual's knowledge base rather than directly affecting health behaviors; hence, health promotion interventions that rely on providing information typically do not have major impacts (Flay & Petraitis, 1994). The socio-cultural environment influences health-related values through entities such as the government, schools, the media, entertainers, advertisers, and other people with whom the individual has little personal contact, and personal health becomes more relevant to individuals when these entities emphasize health over time (Flay & Petraitis, 1994). Health-related values contribute indirectly to health behavior, but they directly affect how individuals evaluate expected consequences of health behaviors (Flay & Petraitis, 1994). Health-related beliefs and values combine to shape the individual's attitudes toward health behaviors (Flay & Petraitis, 1994). An individual's attitudes toward health behaviors are further shaped by expectations of the consequences of exercising a health behavior, which are informed by health-related information in the socio-cultural environment; in addition, attitudes are also shaped by an evaluation of these consequences, which are informed by which health values that are communicated through the socio-cultural environment (Flay & Petraitis, 1994).

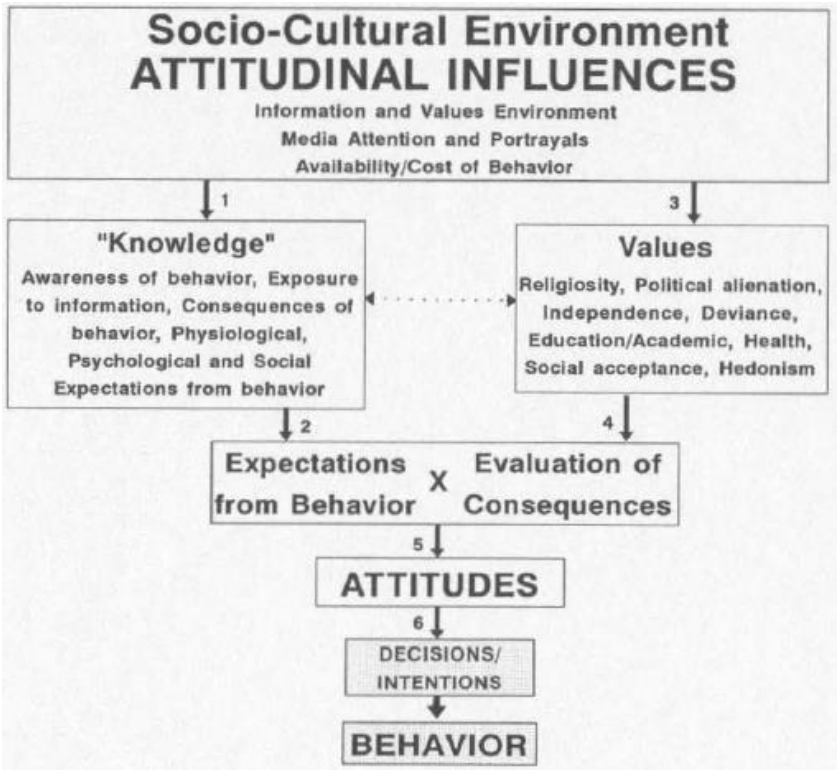

Figure 2.6 Attitudinal influences on health behavior.

The tiers for the social influences stream of influence are shown in Figure 7. Originating in the individual's immediate social environment, this stream consists of health behavior-related factors which impact perceived social pressures to begin or continue a health behavior (Flay & Petraitis, 1994). An individual's health behaviors are impacted by the social environment in two ways. First, the social environment affects who an individual bonds most closely to directly, as well as affecting with whom an individual is motivated to comply indirectly (Flay & Petraitis, 1994). An assumption in this stream is that an individual observes and imitates the values, attitudes, and behaviors of others in the social environment with who he or she is most closely bonded (Flay & Petraitis, 1994). Second, the broader social environment influences the health-related values, attitudes, and behaviors of others in the individual's social environment (Flay & Petraitis, 1994). The health-related values, attitudes, and behaviors of others in the individual's social environment impact the perceived norms in terms of health behavior (Flay & Petraitis,

1994). Together, perceived norms and motivation to comply directly affect beliefs about social norms and indirectly influence whether the individual will adopt a health behavior (Flay & Petraitis, 1994).

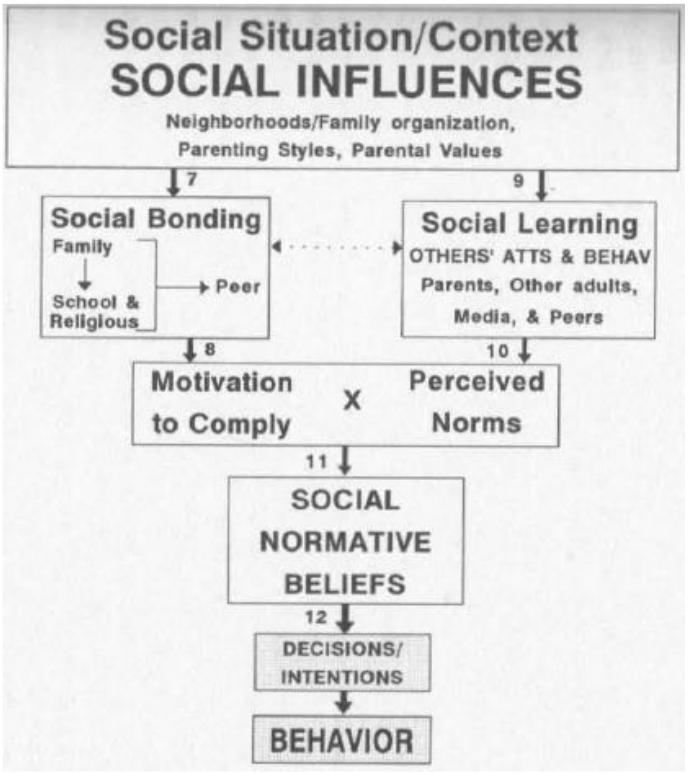

Figure 2.7. Social influences on health behavior.

The tiers for the intrapersonal influences stream of influence are shown in Figure 8. Individual characteristics, such as inherited traits and personality dispositions, may cause two individuals to make different health behavior decisions, even given the same social environment and attitudes; hence, they contribute to health behavior as well and constitute the third stream of influence (Flay & Petraitis, 1994). The "Big Five" personality traits constitute the theoretical foundation for the intrapersonal influences stream in the TTI (Flay & Petraitis, 1994). This stream makes the assumption that the process of adopting health-supporting behaviors to replace health-compromising ones is often difficult (Flay & Petraitis, 1994). The first two of the "Big Five" personality traits in this stream of influence relate to self-determination: Individuals with

the ability to control their behaviors and emotions are more likely to develop more coherent self-concepts and stronger self-esteems (Flay & Petraitis, 1994). This, in turn is believed to increase the value one places on self-determination, which results in an increased interest in planning, regulating, and restricting their health behaviors (Flay & Petraitis, 1994). On the other hand, individuals with low self-determination are more likely to take risks, be impulsive, and fail to fully consider the consequences of their health behaviors (Flay & Petraitis, 1994). The third and fourth "Big Five" personality traits relate to health-related skills: Individuals who are extroverted and sociable have strong social competence; as a result they are likely to perceive themselves as having the necessary skills to engage in health supportive behaviors (Flay & Petraitis, 1994). Individuals who are introverted or have weak sociability, however, have poor social competence, which makes them more likely to doubt that they have the required skills to successfully engage in health supportive behaviors (Flay & Petraitis, 1994). Overall, individuals who have self-determination to control their own health behaviors and who believe they have the skills to perform health behaviors should have stronger health-related self-efficacy and should be more likely to make the decision to engage in health-supporting behaviors (Flay & Petraitis, 1994).

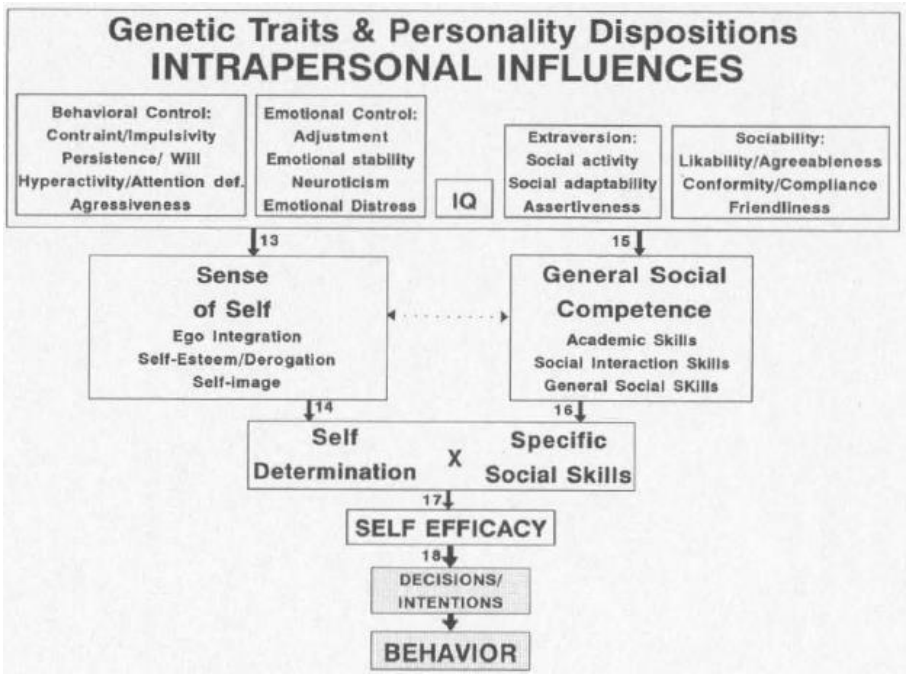

Figure 2.8. Intrapersonal influences on health behavior.

Interstream pathways exist in this model, whereby the factors which primarily affect one stream affect other streams to a lesser extent (Flay & Petraitis, 1994). Interstream pathways may have either additive or interactive affects (Flay & Petraitis, 1994). These pathways also show just how important the ultimate causes of health behaviors are, as these effects flow both within and between streams and thus influence these behaviors in countless ways (Flay & Petraitis, 1994). This points to how important it is for health promotion programs to address ultimate causes in order to generate the greatest long-term impact (Flay & Petraitis, 1994). Feedback loops exist in the TTI as well: As individuals engage in health behaviors, they acquire experience which may influence future health behaviors (Flay & Petraitis, 1994). In the social influences stream of influence, individuals are more likely to repeat a health behavior if they received reinforcement and are less likely to repeat a health behavior if they received punishment from people they are eager to please (Flay & Petraitis, 1994). Feedback loops exist in the attitudinal and intrapersonal streams of influence as well (Flay & Petraitis, 1994). When an individual

engages in a health behavior for the first time, the feedback loop tends to be long and extend up to the second tier; however, as the individual engages in the health behavior more regularly the feedback loops shortens, eventually becoming so short that the behavior becomes habitual (Flay & Petraitis, 1994). This relationship between experience level and feedback loops explains why it is important that interventions take into account and are tailored to the experience level of the target population (Flay & Petraitis, 1994).

A key point in the TTI is that the decision to engage in a health behavior is the most proximal cause of that health behavior (Flay & Petraitis, 1994). An individual's decision is subjectively rational at best, as individuals typically do not evaluate all possible consequences of a health behavior against those of an alternative health behavior, nor do they consistently evaluate or value these consequences (Flay & Petraitis, 1994). In addition, the anticipated consequences of health behaviors are more important than the actual consequences (Flay & Petraitis, 1994). Health behavior decisions therefore follow a rational process, meaning they make sense from the perspective of the individual making the decision, yet they are usually based on inaccurate input (Flay & Petraitis, 1994).

Structural-Ecological Model

The structural-ecological model of Cohen et al (2000), which is built in previous ecological theories, is an attempt to explain the objective and tangible factors that impact health outcomes in a simple and practical way. Structural interventions address the factors that beyond the individual's control, such as social and physical environments (Cohen et al., 2000). The goal of structural interventions is to alter the shape and mean of the distribution of risk behaviors for an entire population (Cohen et al., 2000). The decision to use a structural intervention instead of an individual-level intervention depends on the prevalence of the behavior that is targeted to

change: If the prevalence is high, which is defined by Cohen et al as being within two standard deviations of the mean in a normal distribution curve, then a structural intervention is appropriate (Cohen et al., 2000). These interventions are usually targeted at the neighborhood, worksite, or community level (Cohen et al., 2000). Structural factors can change health behavior directly; thus, behavior change can be accomplished without changing individual-level factors such as beliefs, skills, knowledge, or attitudes (Cohen et al., 2000). Because of the number of people they are able to impact and because people are passively but unavoidably exposed, structural interventions are able to have an effect on everyone, regardless of individual risk (Cohen et al., 2000). Four modifiable structural factors which are meant to influence population-wide behavior are identified in the structural-ecological model: Availability of consumer products, physical structures, social structures, and media and cultural messages (Cohen et al., 2000). These four social factors can be complementary, and the degree of exposure to each of these four factors varies across different populations (Cohen et al., 2000).

Availability refers to how accessible the consumer products that have an impact on health outcomes are; in general, more accessible products are consumed at higher rates than less accessible products (Cohen et al., 2000). Greater availability may influence individual attitudes and beliefs: Individuals may infer that these products are safe, acceptable and that they need to have to use them (Cohen et al., 2000). However, availability of products can change behavior without changing individual beliefs, attitudes, or cognitions as well (Cohen et al., 2000). Physical structures refer to the characteristics and quality of design of tangible objects, such as structures or consumer products, which influence safety and opportunities for healthy behaviors (Cohen et al., 2000). The quality and appearance of these structures can communicate to individuals what are acceptable and unacceptable behaviors, thereby influencing behavior

(Cohen et al., 2000). Physical structures can change behavior without changing individual beliefs, attitudes, cognitions, or behavior (Cohen et al., 2000). Social structures are laws or policies that impact behavior, either by requiring or prohibiting it; in structural interventions, social structures could limit high-risk behaviors and encourage low-risk behaviors (Cohen et al., 2000). Another component of social structures is enforcement, which may be formal or informal and assists individuals in complying with laws or policies (Cohen et al., 2000). Social structures can influence health behavior directly, without changing individual factors such as attitudes or beliefs; however, they may also influence health behaviors indirectly by changing social norms and expectations (Cohen et al., 2000). Media and cultural messages are messages that are frequently seen and heard by individuals (Cohen et al., 2000). These messages are communicated through large and small media outlets, as well as through stories and cultural practices (Cohen et al., 2000). Media messages can impact perceptions of products by increasing how significant products seem, as well as establishing norms of product usage and the behaviors and values associated with products (Cohen et al., 2000). When applied to individual-level interventions, the goal of media and cultural messages is to change individual beliefs or knowledge; however, when applied to structural interventions, media and cultural messages try to influence norms (Cohen et al., 2000).

The four structural factors of the structural-ecological model have been used to explain the increase in obesity rates in the United States in recent years. The availability of high-fat, highly processed, and high-calorie foods has increased, and the price of these foods is lower than low-fat foods, making them more accessible (Cohen et al., 2000). The physical characteristics of these foods increases the likelihood that they will be consumed more than low-fat foods; in addition, the physical design of macro environments such as cities and towns has resulted in

increased dependence on automobiles, resulting in lower levels of physical activity (Cohen et al., 2000). Social structures have resulted in more time spent commuting and more sedentary jobs, leading to even lower levels of physical activity (Cohen et al., 2000). Finally, media messages impact obesity rates by advertising foods and by encouraging people to participate in sedentary behaviors, such as watching television (Cohen et al., 2000).

Model of Community Food Environments

The Model of Community Food Environments (Figure 9) is an ecological model of health that seeks to explain nutrition environments, drawing from eating outcome-related concepts from fields such as public health, health psychology, consumer psychology, and urban planning (Glanz, Sallis, Saelens, & Frank, 2005). In this model, environmental, social, and individual factors influence eating behaviors; as a result, the risk of developing a number of chronic diseases is affected (Glanz et al., 2005). Nutrition environments have two pathways of influence on eating behavior, and the effects of these environments can be mediated or moderated by perceived environmental factors, as well as demographic or psychosocial factors (Glanz et al., 2005).

This model identifies four types of nutrition environments: The community nutrition environment, the organizational nutrition environment, the consumer nutrition environment, and the information environment (Glanz et al., 2005). The first type of nutrition environment, the community nutrition environment, can be examined by observing the distribution of food sources, including the number, type, location, and accessibility of food outlets (Glanz et al., 2005). Organizational nutritional environments, the second type of nutrition environment, include home, school, work, or other (Glanz et al., 2005). Of the organizational nutrition environment, the home environment is perhaps the most dynamic and complex, as it is affected

by the availability of food at other outlets (Glanz et al., 2005). There is also a social component to the home environment, as the individual who primarily shops and prepares food strongly influences the eating patterns of others in the household (Glanz et al., 2005).

Data on the third type of nutrition environment, the consumer nutrition environment, pertain to what individuals encounter within and around a retail food outlet, such as a restaurant or store (Glanz et al., 2005). Consumer environment data may apply to food sources in organizational environments as well, with the possible exception of the home environment (Glanz et al., 2005). Characteristics of the consumer nutrition environment which may be relevant are nutritional qualities, prices, promotions, product placement, range of choices, freshness, nutritional information, percentage of shelf space used for healthy food options, and product promotion and product placement related to children (Glanz et al., 2005). Restaurant nutrition environments in particular may be evaluated by the availability of healthy options by examining the availability of fruit, non-fried vegetables, healthy main dish choices, as well as portion sizes (Glanz et al., 2005). Another important factor in the nutrition environments for restaurants is whether nutritional information is available where it is most informative to consumers: At point of choice (Glanz et al., 2005). Finally, the fourth type of nutrition environment is the information environment, which is an independent type of environment and may operate at a national, regional, neighborhood, store, or restaurant level (Glanz et al., 2005). Government and industry policies affect advertising and media reports, which constitute the information environment (Glanz et al., 2005). The information environment then affects individual attitudes, as well as how appealing certain foods and food sources are (Glanz et al., 2005). All four types of nutrition environments are affected by governmental policies, as well as the policies of other organizations (Glanz et al., 2005).

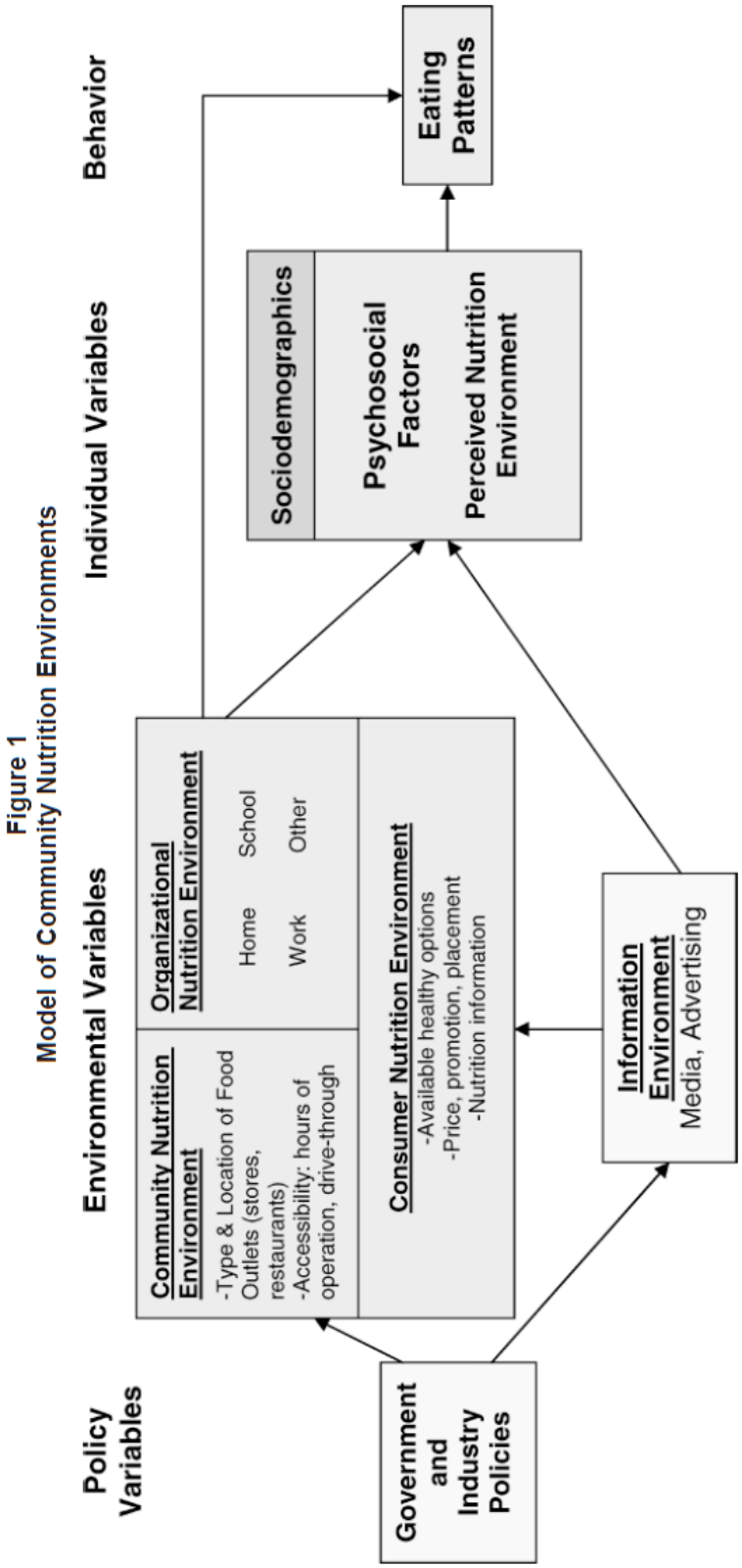

Figure 2.9. The Model of Community Nutrition Environments.

Resources and Skills for Self-Management Model

The Resources and Skills for Self-Management model (Figure 10) is built on the premise that self-management interventions do not enable individuals to control their own behavior; instead, the ability of individuals to self-manage their own behaviors depends on the surrounding environmental context (Fisher et al., 2005).

This model was based on self-management for individuals with diabetes; however, because of the self-management requirements for these individuals, the model can be extended to multiple health behaviors. This is because of the concept of "equifinality," which explains how different approaches to intervention may have similar roles or purposes (Fisher et al., 2005). Equifinality refers to different programs using different procedures or following different paths to achieve common final outcomes (Fisher et al., 2005). This concept applies not only to self-management in the case of diabetes, but also to other areas of health promotion (Fisher et al., 2005). In other words, multiple tactics can be used to support the functions and objectives of self-management and, more specifically, this approach to self-management that emphasizes RSSM has much in common with other treatment approaches available (Fisher et al., 2005).

A wide array of factors influence self-management behavior, including interventions and influences directed at the individual, as well as social, organizational, community, policy, and economic factors; therefore, ecologically-based self-management interventions address multiple levels of influence, integrating the individual's skills and choices with social, physical, and policy environments (Fisher et al., 2005). Because disease management must be established throughout one's daily life, it impacts a vast array of activities and thus faces a plethora of barriers (Fisher et al., 2005).

Fisher et al and colleagues identify six key resources and supports for self-management (RSSM): Individualized assessment, collaborative goal setting, skills enhancement, follow-up and support, access to resources in daily life, and continuity of quality clinical care (2005). Different RSSM are best addressed at various levels of influence, with some best addressed at the individual level and others best addressed at the group, system, and policy levels (Fisher et al., 2005). Which specific approach is most effective to addressing each RSSM depends on which individuals are being served, as well as their preferences and which settings they inhabit (Fisher et al., 2005). Viewing self-management approaches through the lens of RSSM provide coherence to the extensive array of different treatment approaches (Fisher et al., 2005).

Key in individualized assessment is the recognition of cultural differences. Self-management education must begin with recognizing the perspective of the individual and the culture from which he or she emerged (Fisher et al., 2005). This must cover a number of important issues including concepts of illness, health, and death; perspectives on medication; and views of the roles of the individual, fate, control, family, and community (Fisher et al., 2005). Collaborative goal setting is based on recognizing the impact on individual behavior of goal setting and the value of interventions which include goal setting (Fisher et al., 2005). There are a number of approaches to collaborative goal setting, and the recognition of the individual's authority over his or her illness is particularly emphasized (Fisher et al., 2005).

Skills enhancement includes teaching various skills, including those involving general problem-solving, preventing relapse, self-monitoring, and enhancing general healthy behavior patterns, such as healthy eating and physical activity (Fisher et al., 2005). There are several principles pertaining to education and behavior change: Identifying and teaching concrete skills; modeling, demonstrating, and rehearsing skills; enhancing performance through self-monitoring

and feedback; monitoring the application of skills in real-life settings and reviewing the outcomes; revising and testing revised plans; and reinforcement at every step (Fisher et al., 2005). Enhancement of the individual's self-management skills, along with the individual's sense of self-efficacy, is indicative of whether an intervention is effective (Fisher et al., 2005). Follow-up and support is an important element in behavior change, and should include help in refining problem-solving plans and skills, encouragement when performance is below expectations, and help in responding to new issues that may emerge (Fisher et al., 2005).

Access to resources in key life is essential in self-management, as self-management skills are of little use without the required resources to exercise them (Fisher et al., 2005). For example, access to healthy foods and attractive and safe settings for physical activity is necessary for maintaining the requisite healthy behaviors (Fisher et al., 2005). Continuity of quality clinical care is necessary to ensure that the individual's efforts are not misdirected (Fisher et al., 2005). Clinical care and self-management are dependent on each other in the other direction as well, as clinical care without self-management may result in failing to reach its potential because of failure on the part of the individual to enact behavioral changes that impact the benefits of clinical care, implement self-management plans, or use prescribed medications (Fisher et al., 2005).

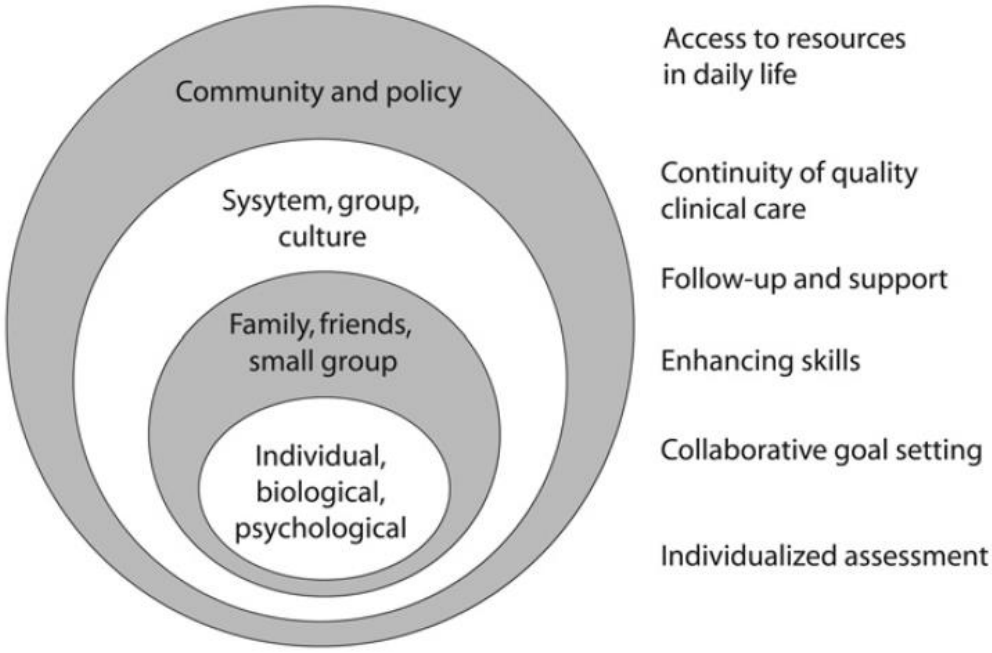

Figure 2.10. The Resources and Skills for Self-Management Model.

Ecosocial Model

Glass & McAtee's ecological model (Figure 11) is meta-theoretical and designed to generate theories and organize research (2006). It is based on the premise that approaching health behavior change by treating individual behavior as separate from the social context and biological influences in which it occurs will result in interventions that are limited in their effectiveness (Glass & McAtee, 2006). This model resists the dichotomies between various levels of influence, and instead embraces the dynamic interplay of factors across rather than within levels (Glass & McAtee, 2006). In this view, knowledge regarding how health behaviors arise, are maintained, and can be changed is limited, and we need to develop better theory and better data to understand how social factors regulate behavior and distribute individuals into risk groups, as well as how social factors become embodied (Glass & McAtee, 2006).

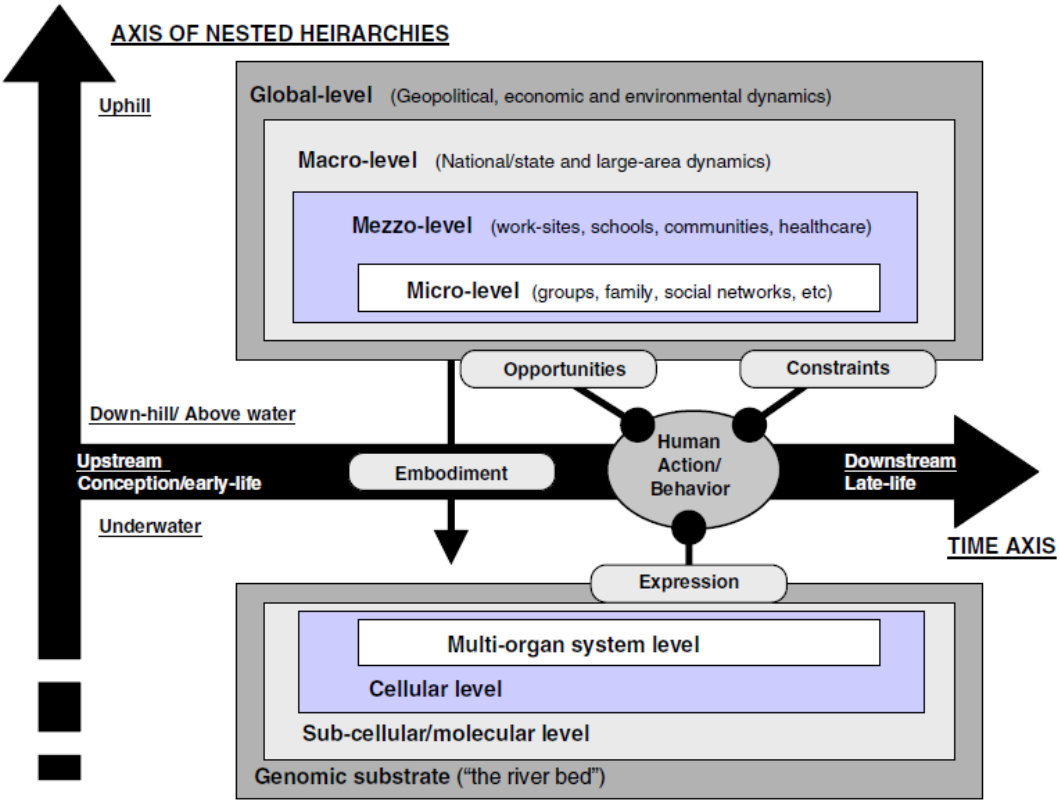

Figure 2.11. The society-behavior-biology nexus as depicted in multidimensional space.

Glass & McAtee's ecosocial model accounts for social context, biology, and the interactions of these throughout the lifespan (2006). The ecosocial model is three-dimensional, which represents a shift from the more traditional two-dimensional linear way of describing causation of health behaviors to a more complex and contingent understanding of the causes of health behaviors (Glass & McAtee, 2006). Glass & McAtee (2006) describe their model using a river as a metaphor. The model is based on two primary axes. The first axis is time, which is horizontal and is represented by the flow of the river across an uneven surface (Glass & McAtee, 2006). This axis represents temporal influences over time (Glass & McAtee, 2006). At the individual level, this is representative of the life-course from birth to death, while at the population level this represents historical influences (Glass & McAtee, 2006).

The second axis is a vertical axis, representing a nested hierarchy of biological and social systems, which spans all the way from genes to the global environment (Glass & McAtee, 2006). These are influences that are external to the individual (Glass & McAtee, 2006). Using the river metaphor, the vertical axis begins in the bedrock with genes, and rises through the biological systems that are underwater; from there, it passes the waterline, where individual behavior occurs, and proceeds above the surface of the river to the larger social structures such as the social, built, and natural environments (Glass & McAtee, 2006). These nested systems are interrelated, complex, and have multiple feedback loops through time (Glass & McAtee, 2006).

The river metaphor is particularly useful when considering the spatial distribution of populations of individuals: Individuals are buoyant objects floating in a network of rivers, streams, and tributaries, beginning at different points and being affected by different topographical features (Glass & McAtee, 2006). The topography may consist of pockets in the riverbed, which are illness states; areas of depression represent enticements or opportunities that attract the flow of water; and there may be bumps, hills, or even mountains that represent barriers to healthy behaviors (Glass & McAtee, 2006). These barriers are not necessarily natural; often times, they are the result of socially-constructed power differentials (Glass & McAtee, 2006). Actions and policies of people are largely responsible for the placement of these obstacles as well (Glass & McAtee, 2006). The ability to overcome these barriers depends on the resources available to individuals; with insufficient resources, they take the shortest and easiest course, which is to succumb to these barriers (Glass & McAtee, 2006).

This model conceptualizes human behavior as being inserted indivisibly between environment and biology: Behavior is the result of the dynamic interchange between the ecological factors above and the physiological factors below the surface of the river (Glass &

McAtee, 2006). This combination of factors results in health behaviors that occur in patterns (Glass & McAtee, 2006). These factors above and below the river's surface influence each other at various levels and include feedback loops (Glass & McAtee, 2006). Another important concept in this model is embodiment, which describes the way that internal biological systems are shaped in response to exposure to external environments over time (Glass & McAtee, 2006).

Because focusing on health behaviors does not satisfactorily explain the association between individual health and social conditions, the ecosocial model focuses on health action, instead of health behavior; as a result, the implication is that the aspects of social structure that impact the consciousness and knowledge base of social actors participating in social action should be prioritized (Glass & McAtee, 2006). In other words, the focus is not on identifying which factors are causes of disease, but rather on finding powerful levers to create behavior change within entire populations; furthermore, these levers do not need to be causal in the more traditional sense (Glass & McAtee, 2006).

According to this model, individual behavior is the result of the interplay between the set of opportunities and constraints offered by the specific environment and a knowledgeable and goal-driven individual actor (Figure 12) (Glass & McAtee, 2006). Glass and McAtee propose a new type of variable that describes factors that influence health outcomes in populations in a more indirect way than causal risk factors; in addition, this new type of variable operationalizes the way that social structure affects behavior and becomes embodied by individuals (2006). They label this new type of variable a "risk regulator," and it captures the aspects of social structure that influence individual behaviors (Glass & McAtee, 2006). These are not causes, but instead are characteristics of the social context that explain the way that causes are distributed and how they accumulate (Glass & McAtee, 2006). Risk regulators exist above the individual

level, but below macro levels; they create constraints and opportunities that impact behavioral risk and protective factors; and they operate through multiple pathways and through complex causal operations in a temporal and spatial manner (Glass & McAtee, 2006). Risk regulators are not themselves risks, but they regulate the probability of exposure to more distal behaviors and other risks that lead to negative health outcomes (Glass & McAtee, 2006). Another function of risk regulators is to index the structured contingencies in the environment as they are experienced by social actors in settings of social action (Glass & McAtee, 2006). Structured contingencies may be described at different levels, from families all the way up to macro levels; they are likely to affect patterns of risk, and they consist of specific and stable dimensions with varying contexts that exist externally to individuals (Glass & McAtee, 2006). The ways that risk regulators actually originate from social and environmental conditions is assumed by Glass and McAtee to be "hypercomplex" (2006).

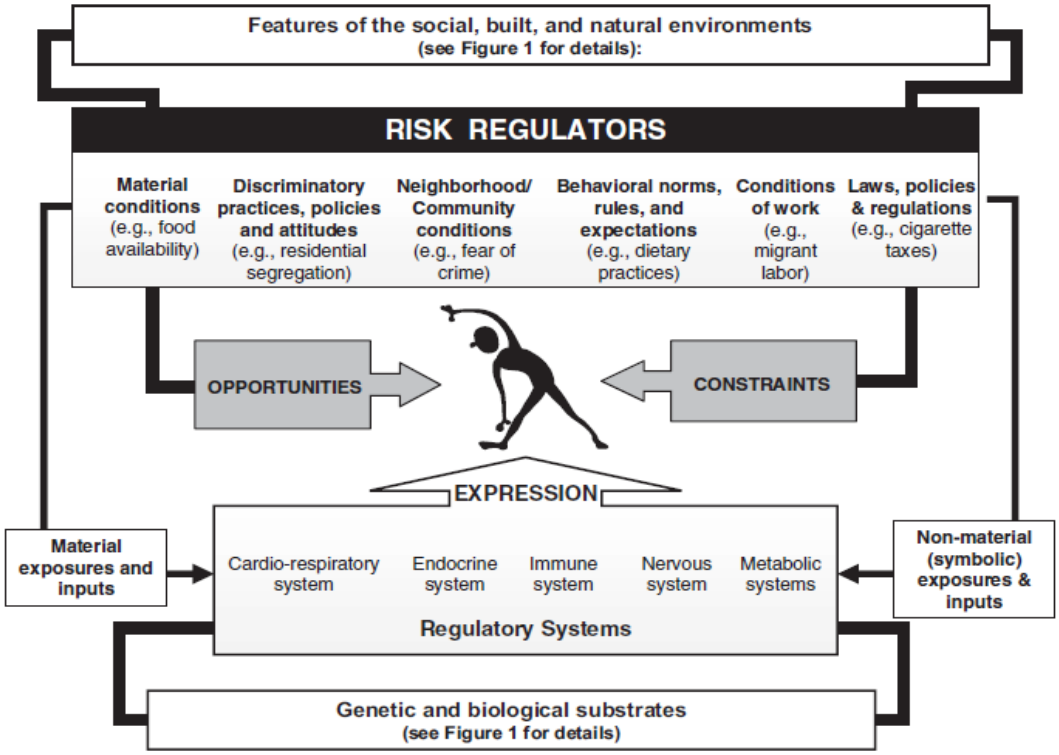

Figure 2.12. Detailed description of the sphere of human behavior/action from Figure 11.

Biological processes regulate the expression of behavior in the ecosocial model (Sallis et al., 2008). Biological systems metabolize or process inputs from the environment; they negotiate the physical and social environment of the individual, regulating responses to inputs and even inducing countermeasures against threats (Glass & McAtee, 2006). The limits and characteristics of feedback from biological systems shape individual behavior, as well as the social and environmental structures further up the hierarchy (Glass & McAtee, 2006).

Glass and McAtee have applied their ecosocial model of health behavior to obesity (Figure 13) (2006). They describe the risk regulators to be social conditions that exist in schools, neighborhoods, and homes, which influence food intake and physical activity (Glass & McAtee, 2006). Changes in food intake and physical activity behaviors result in a shift in the balance of energy intake and energy expenditure, resulting in a change in body weight. Cross-level interactions also occur, which affect biological factors and, in turn, directly affect health behaviors (Glass & McAtee, 2006). Social factors, such as commercial messaging, also impact the influence of risk factors for obesity (Glass & McAtee, 2006). Finally, the authors hypothesize several feedback loops, whereby change in body weight, or embodiment, modifies biological control parameters (Glass & McAtee, 2006).

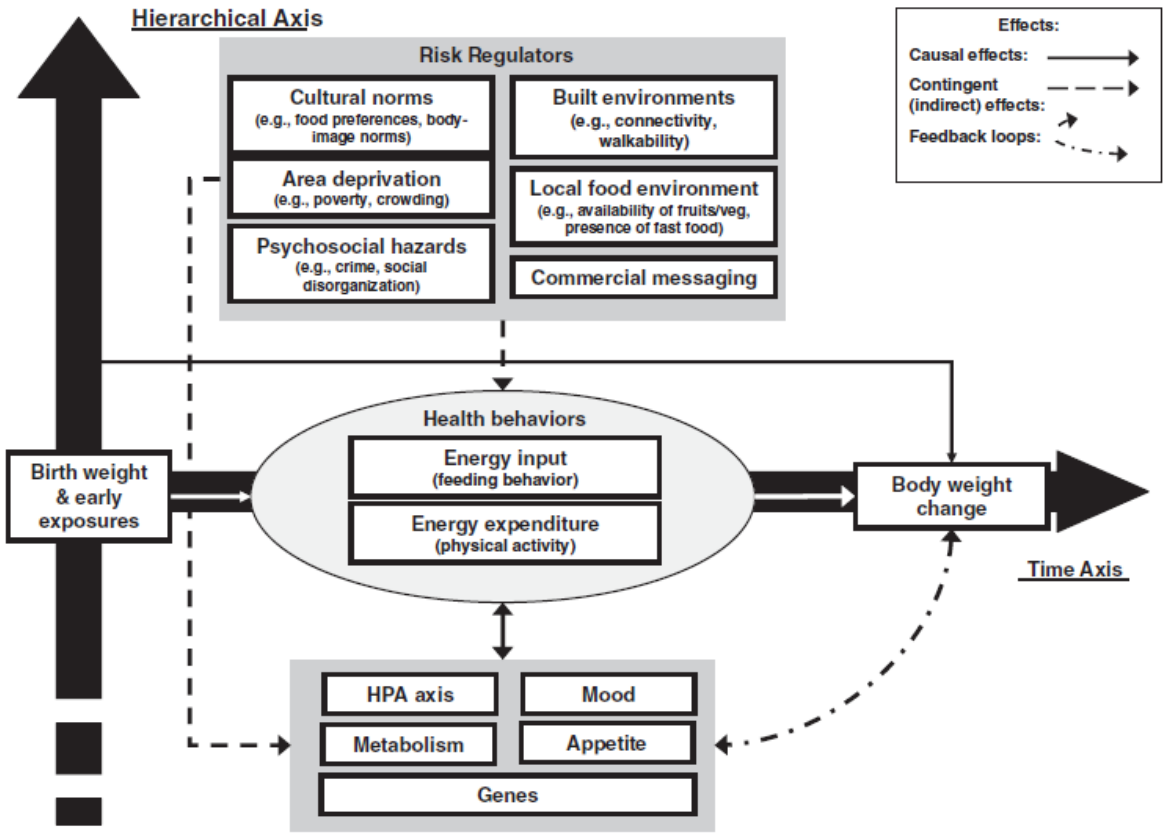

Figure 2.13. Diagram of the Glass and McAtee (2006) model applied to obesity.

Application of Social Ecological Models in Health Promotion

Golden and Earp (2012) conducted a metanalysis to determine the use of social ecological models in health promotion efforts, reviewing 157 articles which described 132 interventions, addressed 21 behaviors, and took place in eight different settings (Golden & Earp, 2012). They developed a coding system to evaluate intervention activities, targets, behavioral health topics, program settings, and the theoretical bases for the interventions (Golden & Earp, 2012). When social ecological models were used, they were analyzed along two dimensions: Activities, which were grouped based on the individuals who received skills enhancement, training, or education or the level of the environmental modification; and targets, which were identified based on the health behavior cause measured and/or identified as the mechanism for change (Golden & Earp, 2012). The authors used McLeroy et al's Ecological Model of Health

Behavior (1988) as the frame of reference for social ecological model analysis. The most common interventions included in this review were based around nutrition (more than one-third of the articles) and physical activity (more than one quarter) (Golden & Earp, 2012).

The results of the metanalysis revealed a great deal about trends in the use of social ecological theories in recent years (Figure 14). Overall, regardless of topic, setting, theory, or time period, the articles reviewed were more likely to describe intervention activities and targets for the lower levels of the McElroy et al model. Most articles (63%) discussed interventions which addressed only one or two levels (Golden & Earp, 2012). Interventions which focused on nutrition, physical activity, and smoking were the most likely to be multilevel, with between one-third and one-half of these articles including activities at three or more levels (Golden & Earp, 2012). Intervention activities were focused at the individual (95%) and interpersonal (67%) levels most frequently, with interventions at the institutional (39%), community (20%) and policy (6%) levels appearing far less frequently (Golden & Earp, 2012). Certain settings more frequently featured interventions that addressed particular levels; for example, more than half of the interventions in schools and workplaces included activities at the institutional level (Golden & Earp, 2012). Similar patterns were found for intervention targets (Golden & Earp, 2012).

Social ecological models were used as the intervention base for less than 10% of the articles in this study (Golden & Earp, 2012). Interventions with a stated theoretical base were not more likely to feature activities at the higher levels or at three or more levels than those which did not have a stated theoretical base; however, there were differences found in these two criteria when the stated theoretical base was a social ecological model (Golden & Earp, 2012). Articles which discussed interventions which explicitly stated a social ecological model as a base were more likely to include activities at higher levels and at more than three levels (Golden &

Earp, 2012). Finally, there were chronological differences in the use of interventions that were institutional and multi-level, with an increase found when comparing the last two decades (Golden & Earp, 2012). However, differences in the last two decades in levels addressed by interventions and number of levels addressed by interventions were not significant, and this remained true even when the time frames were divided into one- and five-year increments (Golden & Earp, 2012).

The researchers conclude that the increased emphasis on social ecological approaches has largely gone ignored in practice, as higher and multi-level intervention approaches remain have not become the norm (Golden & Earp, 2012). There are several possible reasons for this. One is that interventions are often provided with limited resources and scope; thus, expecting that every intervention address three or more levels may be unrealistic (Golden & Earp, 2012). Another is that health promotion practitioners who are accountable to funding sources may find that intra- and interpersonal interventions are more appealing because they offer more easily measured objectives (Golden & Earp, 2012). Measuring changes at higher levels is more difficult because of a lack of validated methods to do so (Golden & Earp, 2012). Furthermore, many health promotion practitioners may not have the training or resources needed for interventions that address higher levels (Golden & Earp, 2012). Finally, health promotion practitioners, particularly those who work in the nonprofit or government sectors, may be limited in their ability to engage in the activities required in higher level interventions, such as policy or advocacy (Golden & Earp, 2012).

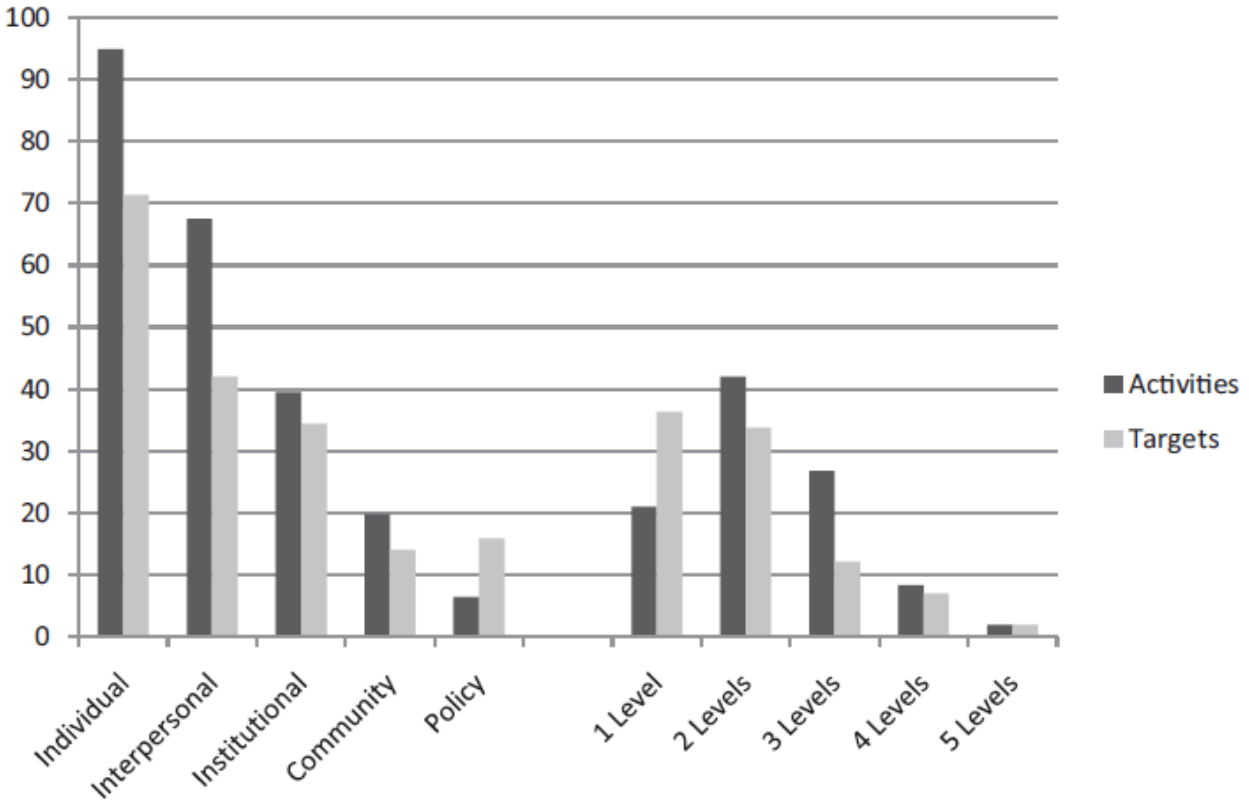

Figure 2.14. Percentage of articles describing intervention activities and targets of change at different levels.

Settings

The concept of setting is a core aspect of health promotion theory and practice (Green et al., 2000). Settings provide a convenient path for targeting health promotion interventions (Dooris, 2004). In health promotion theory, the settings concept provides conceptual boundaries for understanding context, allowing health promotion efforts to emphasize ecological approaches that are more contextually sensitive by appreciating that the places where people live are crucial to their health (Dooris, 2012; Green et al., 2000). A fundamental belief in the field of health promotion is that deep understanding and long experience in the culture of that specific setting is necessary to perform health promotion work effectively (Green et al., 2000). In practice, the setting concept assists health promotion programs in being responsive to the particular

circumstances of program participants (Green et al., 2000). Settings further define the recipients, location, and frames of the setting itself of health promotion programs, as well as providing the context and social structure for health promotion program planning, implementation, and evaluation (Green et al., 2000). The settings approach is also appealing to health promotion practitioners because they allow health promotion efforts to be directed in a pragmatic and manageable way (Green et al., 2000). This can be attributed to the fact that settings have definable structures, routines, pathways of entry, and pathways of change; are relatively stable over extended periods of time; are not as ambiguous as community or society; and are easier to operationalize than at-risk populations (Green et al., 2000).

Health promotion includes multiple approaches, including the issue approach and the population approach; however, the settings approach, in which the focus is on a particular setting, has become increasingly common in health promotion (Green et al., 2000). This shift towards the settings approach can be partially attributed to ecological approaches to health promotion (Green et al., 2000). This approach is based on the understanding that determinants of health extend beyond individual lifestyle and health services factors, with social, economic, organizational, environmental, and cultural factors all determinants in health (Dooris, 2012). The settings approach offers a number of benefits in terms of effectiveness. It provides comprehensive framework to work within and involve multiple stakeholders; it facilitates connections between behavior, people, and settings; it encourages relationships between groups of people within a specific setting; it allows interactions between different issues and initiatives to be acknowledged and taken account of; it looks both inward and outward; and it aids and maximizes the contributions of particular settings to broader public health (Dooris, 2005).

Seeking to balance top-down and bottom-up approaches and driven by both public health and organizational agendas, the settings approach has three key characteristics (Dooris, 2004). First, it is based on an ecological model, focusing on change within an entire organization and applying "whole systems thinking" (Dooris, 2005). Second, reflecting on the ecological model, it takes a systems perspective, understanding settings as dynamic and complex systems with inputs, throughputs, outputs, and impacts (Dooris, 2005). Third, it seeks whole system organization development and change focus, using organizational and community development to initiate change within entire systems (Dooris, 2005; Dooris, 2012). This involves using multiple and interconnected interventions to integrate health within an entire culture, daily life, and activities of a particular setting; modifying the built environments where people live and work to promote health; and engaging with and promoting health within entire communities (Dooris, 2012).

Challenges to the Settings Approach

The settings approach to health promotion can be valuable in planning and delivering health promotion in contextually-sensitive ways which take into account the complex determinants of health; however, the use of a settings approach in health promotion faces several future challenges (Dooris, 2006). First, the theoretical base must be clarified (Dooris, 2006). An important step is to clarify the range of terminology, understandings, and practice that fall under the concept of "health promoting settings" (Dooris, 2006). The semantic differences between different terms which fall under this concept need to be acknowledged, as these differences may influence understanding and practice (Dooris, 2006). It is important that a balance is struck of accepting similarities and differences with a shared focus on building a mutual conceptual understanding of the settings approach (Dooris, 2006). Another future

challenge is remaining focused on the bigger picture, and "joining up" settings, in the face of the continuing threat that the settings approach may result in a tendency towards narrowness and division (Dooris, 2006; Dooris, 2012). Connections need to be made outwards, across settings, as well as upwards, to influences at higher levels (Dooris, 2006). Ensuring that interventions in different settings are not operating in silos is important for several reasons. First, issues of health often span organization and geographic boundaries; therefore, the fact that a health issue which is present in one setting may have its origin in another must be acknowledged (Dooris, 2012). Second, people's lives exist in multiple settings, both concurrently and consecutively; thus, health promotion must take a holistic approach, taking into account these interconnections (Dooris, 2012). Third, settings function across multiple levels, and a given setting may be located within another (Dooris, 2012). Because of this, influences across and between settings must be analyzed, and how an intervention in one setting can contribute to accomplishing health goals in the larger setting in which it exists must be considered (Dooris, 2012).

Other challenges face the settings approach moving forward as well. There is concern that it may make existing health inequalities even worse which, due to its focus on formal settings, may leave out the most marginalized populations (Dooris, 2012). Dooris (2012) identifies five means to counter this possible consequence: Strengthen and learn from interventions which are already explicitly dealing with issues of inequality; extend the settings approach to informal and non-institutional settings; acknowledge the power differentials between and within settings, both by ensuring commitment and leadership from high levels and engaging and empowering stakeholders; focus on interventions which address higher levels of influence, seeking to create structures, policies, practices, environments, as well as broad social, economic, and political factors which are supportive of health; and build an evidence base by evaluating the

impacts of different interventions on health equality (Dooris, 2012). Another major challenge is joining parallel health promotion agendas across settings together, thus moving beyond the boundaries of traditional health promotion (Dooris, 2012). Three points can be made in regard to this challenge. First, health practitioners must be proactive in forming these connections, which will require they use innovative approaches to coordinate and integrate these efforts (Dooris, 2012). Second, the whole systems and ecological perspectives which form the theoretical basis for the settings approach must be translated into practice (Dooris, 2012). Finally, given the potential many settings have to generate change at higher levels, the settings approach should be used to generate such change, including enhancing corporate social responsibility (Dooris, 2012).

A final challenge is to continue to develop an evidence base, particularly in relation to evaluation (Dooris, 2006). There are several challenges specific to evaluating the effectiveness of the settings approach. For one, the overall evidence system for public health research focuses primarily on interventions featuring specific health issues and single risk factors, rather than multiple settings and multiple settings (Dooris, 2012). As a result, most systematic reviews and metanalyses are focused on narrower interventions and not on comprehensive settings approaches (Dooris, 2005). If the settings approach is to be realized to its full potential, individuals in public health must not be allowed to reduce its complexity by narrowing its scope to individual behavior change and reducing its focus to health promotion in a single setting The overall evidence system for public health research focuses primarily on interventions featuring specific health issues and single risk factors, rather than multiple settings and multiple settings (Dooris, 2012). Another pertains to the diversity of conceptual understandings and practice, which makes it difficult to generate a body of evidence which allows for transferability and comparability (Dooris, 2005; Dooris, 2012). This challenge comes in a number of forms:

including high conceptual variance, where the settings concept has been used incorrectly; pragmatic influences, as real-life constraints and opportunities affect to what degree theory can be applied in practice; size and type of settings, as current evidence describes a wide variety of settings in terms of these characteristics; and standards and accreditation, with interventions varying in terms of whether they have formal standards and criteria or not (Dooris, 2005). The final challenge is related to the complexity of such evaluations, since the settings approach is characterized by an ecological perspective and whole systems thinking (Dooris, 2005; Dooris, 2012). This has resulted in a tendency to evaluation only discrete interventions in specified settings (Dooris, 2012). Two factors are relevant to the complexity of settings approach evaluation. First, the more successful an intervention is, the more difficult it is to evaluate (Dooris, 2005). Second, to truly capture the added value of an intervention for an entire system, an evaluation must examine factors beyond the intervention and its context (Dooris, 2005). Instead, it must examine the interrelationships, interactions, and synergies both within and between settings with regard to different population groups, system components, and health issues (Dooris, 2005).

To reconcile such challenges to settings approach effectiveness evaluation Dooris (2005) suggests the use of theory-based evaluation (TBE); in particular, he suggest a "theories of change" approach, which draws on the use of logic models and realistic evaluation (Dooris, 2005). This approach provides a framework for both development and evaluation (Dooris, 2005). TBE makes stakeholder participation in theory generation a priority; explores the links between activities, outcomes, and settings; and takes into account the interrelationships between individuals and their environments (Dooris, 2005). TBE requires explicitly stating the assumptions and hypotheses on which the intervention is based (Dooris, 2005). TBE also

includes the vision and strategic goals of the intervention, as well as the needs and assets of the particular context of the intervention; the rationale for the intervention; anticipated consequences, and indicators of functioning (Dooris, 2005).

Using TBE requires that a number of potential issues are addressed. First, dedicated funding is necessary to allow for TBE to be applied within and across settings in a coordinated way (Dooris, 2005). Interventions are often underfunded, thus lacking the resources needed to complete a complex evaluation, in addition, interventions in different settings tend to function in isolation, making it difficult to use an evaluation model which measures outcomes beyond and across settings (Dooris, 2005). Providing dedicated funding is critical in measuring and understanding impacts, outcomes, and synergies of interventions (Dooris, 2005). Second, evaluation must engage policymakers during the course of planning and conducting an evaluation to help ensure that findings contribute to a wider evidence base (Dooris, 2005). Third, generic theories that underlie approaches across settings must be clarified, developed, and articulated, and inform the approach used within particular settings (Dooris, 2005).

Setting Phenotypes

Settings can be distinguished by genotypes and phenotypes. A setting phenotype is a group of settings that share the same genotype, yet consistently and meaningfully differ in the behavior episodes in each particular setting (Luke et al., 2002). By meaningful, the authors mean that these differences are interpretable and related to setting characteristics in ways that are theoretically stimulating, and by consistently the authors mean that these differences are stable over time and found in multiple locations (Luke et al., 2002). Phenotypes are not defined by the individuals or physical elements; instead, they are defined by the behavior episodes that occur in

the setting (Luke et al., 2002). They are classified based on these meaningful and consistent patterns of behaviors, not on the perceptions of the setting inhabitants (Luke et al., 2002).

Luke and colleagues (2002) identified three important features of a behavior setting: Resources, internal dynamics, and context. The quantity and quality of resources are important, and resources may include people, behavior objects, physical space, and accessibility to information (Luke et al., 2002). Personal cognitions and motives, functional activities, social processes, stability, and growth are examples of the internal dynamics of a setting (Luke et al., 2002). Important elements of the context of a setting may be history; links to other settings or larger organizational or social units; and political, economic, and legal conditions (Luke et al., 2002). Another important feature of behavior settings relate to time: The links between individuals and their environments change over time, meaning that different points in its life cycle a setting may place different demands on its inhabitants (Luke et al., 2002).

Activity Settings

The activities in which people engage in everyday are influenced by geographic, economic, and demographic factors (Gallimore, Goldenberg, & Weisner, 1993). Activity settings are defined as "a perceptible instantiation of the ecological and cultural system which surrounds the family and the individual" (Gallimore et al., 1993). They generate "slots" for activities to occur, as well as define the purpose of the activity and the script for carrying it out (Gallimore et al., 1993). Gallimore and colleagues suggest that activity setting should be a unit of analysis, as they are where individuals and the surrounding cultural and ecological environment come into contact (1993). Both objective and subjective features must be understood in operationalizing activity settings (Gallimore et al., 1993). There are at least five factors must be analyzed: Cultural values and beliefs, participants involved in the activity, the

function and demands of the activity, the social scripts for actions undertaken in the activity, and the motivations for participants in the activity (Gallimore et al., 1993).

Interventions must take into account the subjective meaning of activity settings to setting participants to be effective and sustainable (Gallimore et al., 1993). The subjective meaning of an activity setting is linked to the culture in which it exists. As indicated in the definition, the cultural context is very important in how activity settings are perceived (Gallimore et al., 1993). Activity settings nested in cultural contexts, thus affecting the beliefs and values of its participants (Gallimore et al., 1993). These beliefs and values shape how the reality of the activity setting is perceived (Gallimore et al., 1993). The perception of reality of activity settings is socially constructed; that is, part of the structure and function of the activity setting is the meaning it has in the minds of setting participants (Gallimore et al., 1993). These meanings are constructed from meanings that are an inherent part of the cultural context and the activities of the setting participants (Gallimore et al., 1993).

Despite the heavy influence culture has in individuals' perceptions of their activity settings, it is important to remember that cultures are not uniform in their values and practices; thus, members of a cultural group cannot be approached with an intervention that assumes that all members of the cultural group are the same (Gallimore et al., 1993). Furthermore, there are similarities in values and activity settings across different cultural groups which can be bridged to generate interventions which link cultures together (Gallimore et al., 1993).

Gallimore et al (1993) point to the presence of culturally available activity slots in the daily routines of individuals which could be potential resources for interventions. Health promotion practitioners can determine these available slots in the context of the cultural milieu in which individuals engage in activities and use them in intervention efforts (Gallimore et al.,

1993). It may be that intervention efforts are not sustainable if changes are too much different from the activity settings already present, however (Gallimore et al., 1993).

Social Settings

Social settings consist of social processes, resources, and the organization of resources (Tseng & Seidman, 2007). Investigating social settings instead of behavior settings shifts the focus from the individual to the interactions between people or larger elements of social organization (E. Seidman, 2012). By focusing on settings or systems to create change, a vast array of different interventions becomes possible (E. Seidman, 2012).

Understanding social settings from an action science perspective requires researchers to generate and test hypotheses regarding how social settings work, how social regularities function, and how approaches to modifying social settings and social regularities work (E. Seidman, 2012). Investigating social settings revolves around four primary sets of questions: Theory, measurement, intervention, and research design and data analysis (E. Seidman, 2012). Theory questions consider what a social setting is, how it operates, and how they differ from other forms of observations (E. Seidman, 2012). Tseng & Seidman (2007) have argued that inadequate theoretical understanding of the key aspects of social settings and how they work within a dynamic system have retarded attempts to change these settings. Having a strong framework for how settings function would strengthen interventions (Tseng & Seidman, 2007). Measurement questions ask how we can measure the complexity of the features and processes of social settings, as well as whether existing instruments and methods are adequate for the task (E. Seidman, 2012). Intervention questions seek to determine whether social settings can be intentionally created or altered, whether strategies for doing so have been identified, whether these changes can improve outcomes for individuals in these settings, and whether interventions

at the policy level can be effective in changing these settings (E. Seidman, 2012). Finally, research design and data analysis questions center around whether research designs are different in social settings compared to designs that investigate individuals, as well as how best to analyze units of observation in settings, which are dynamic and complex in nature (E. Seidman, 2012).

Measuring Social Settings

Studying social settings requires that we are able to capture the complexity of features, processes, and regularities, while maintaining acceptable levels of reliability and construct validity (E. Seidman, 2012). Developing an understanding how to address settings to positively impact individuals is problematic without sufficient means of conceptualizing and measuring social settings; therefore, developing reliable and valid measurement tools is the first step in addressing social settings (E. Seidman, 2012). Social settings are complex multi-level units of observation with demanding conceptualizations and questions; in addition, these settings are dynamic and include resources, allocation of resources, and social regularities (E. Seidman, 2012). The various concepts we study within settings exert their influence in ways that are bi-directional and transactional as well (Tseng & Seidman, 2007). Furthermore, studying social settings call attention to complex issues and challenges that studying individuals does not (E. Seidman, 2012). Psychometrics are unable to capture these complexities. Finally, improving social settings would require an understanding of how to ensure long-term effects (E. Seidman, 2012).

Measuring social settings is possible, although it requires substantial resources (E. Seidman, 2012). Qualitative studies are important in understanding social regularities and advancing our measurement methods, particularly for understanding practices, routines, norms, and interactions of a setting by getting inside the "black box" (E. Seidman, 2012). Ecometrics

and related methods of data analysis are key to understanding social settings (E. Seidman, 2012). One way that social settings and social regularities are studied is through behavioral observations, which are used to look at patterns over time (E. Seidman, 2012). Assessing norms within social settings requires using aggregate self-report measures from individuals within settings (E. Seidman, 2012). Another way to study social settings and social regularities is by assessing social networks (E. Seidman, 2012). Measuring social norms is necessary to understand the multiple perspectives within a setting, and doing so requires aggregating global judgments that are not time-dependent (E. Seidman, 2012). Because there are often several levels of nesting, calculating power is not straightforward (E. Seidman, 2012). Many factors influence the calculation of power when examining settings, so increasing the number of individuals studied is not the solution (E. Seidman, 2012).

A future challenge in studying social settings is understanding how factors at the setting-level interact and combine with other levels of analysis, both at smaller and larger levels (E. Seidman, 2012). Also important is determining how settings are interrelated, how settings are impacted by larger settings, and how phenomena at one level of analysis manifest over time and impact the other levels (E. Seidman, 2012). Despite the challenges to studying social settings, they can be studied, and promising advances continue to occur in the field (E. Seidman, 2012). Furthermore, changing social settings and social regularities is possible, and novel and effective settings have been created through various means, such as changing routines, practices, or even the climate or culture of an organization within a setting (E. Seidman, 2012).

Interventions to Change Social Settings

Tseng & Seidman (2007) identify three aspects of settings that can be targeted by interventions: Social processes, which are the patterns of interactions between people; resources,

which may take various forms, including human, economic, physical, temporal, and social; and organization of resources, which refers to how resources are arranged and allocated. These three aspects are dynamic and mutually interactive, and they affect setting outcomes (Figure 15) (Tseng & Seidman, 2007). Unfortunately, research has neglected setting-level change, which means that there is a dearth of empirical understanding of the development, natural life, and ways to intentionally change settings (Tseng & Seidman, 2007).

An improvement in setting functioning is indicated when the outcomes of a setting change following an intervention (Tseng & Seidman, 2007). These outcomes are not an end-state; rather, they are constantly changing and evolving (Tseng & Seidman, 2007). Three ways that these outcomes are measured are at the individual level through self-reports or aggregated assessments that represent setting-level constructs, at the setting level through observations, and through assessing social processes at a single point in time (Tseng & Seidman, 2007).

Social Processes

The first feature centers on social processes, including social regularities (E. Seidman, 2012). Phenotypes are an operationalization of social regularities (Luke et al., 2002). Social processes are defined as "the ongoing transactions between two or more people or groups" (Tseng & Seidman, 2007). These transactions include social interactions, communication and feedback loops, as well as the possibilities related to their interactions (Tseng & Seidman, 2007). These processes may reveal themselves within settings through relationships, norms, and participation in activities (Tseng & Seidman, 2007). Relationships may be viewed in terms of dyadic relationships, as well as through broader webs of relationships called social networks (Tseng & Seidman, 2007). Social processes are relational units, existing in the temporal and social space among individuals in a setting; therefore, although individuals interpret and make

meaning of these social processes psychologically, that they cannot be measured solely through an individual's perceptions (Tseng & Seidman, 2007). The processes within social settings are crucial in terms of how individuals actually experience these settings; unfortunately, these have rarely been the targets of interventions (E. Seidman, 2012; Tseng & Seidman, 2007). Norms refer to the expectations of and among individuals within a given setting (Tseng & Seidman, 2007). Social processes may be overlapping, and they may guide behaviors within a setting in a particular direction (Tseng & Seidman, 2007). Social processes may be altered by the roles of the individuals within a setting (Tseng & Seidman, 2007). They are also temporal: Transactions are repeated, behaviors are modified based on feedback, and various patterns are reinforced over time, creating a continuous cycle of action (Tseng & Seidman, 2007).

The social processes are numerous within any given social setting; however, the most salient processes to individuals within these settings are those which are patterned across time and determine outcomes at both the setting level and individual level (E. Seidman, 2012). Seidman (2012) refers to such processes as social regularities, which include programmatic regularities, persist in influence and strength over an extended period of time, and represent the status quo (E. Seidman, 2012). Social regularities are expressed in a number of ways, including through norms, routines, practices, social networks, and patterns of interaction, all of which can mutually influence each other (E. Seidman, 2012). These various expressions of social regularities can be seen as concepts and can impact the culture within settings by establishing behavioral scripts, acceptability of various behaviors, and expectations of individuals within these settings (E. Seidman, 2012). Social regularities can also center on various differences among the individuals in a setting, including differences in power, roles, status, and resources (Tseng & Seidman, 2007). Social regularities have the most impact on setting inhabitants' well-

being; therefore, social interventions that target social regularities are the key to improving outcomes at both the individual level and setting level and hence must be changed to effectively change a social setting (E. Seidman, 2012). These concepts provide a way to understand social regularities within a given social setting, thus making them potential avenues for an intervention to address (E. Seidman, 2012). Social regularities are often a central focus to studying social settings (E. Seidman, 2012).

Resources

Resources and their organization are salient structural features that condition or influence the processes within a social setting (E. Seidman, 2012). Resources can be social, physical, economic, temporal, or human (E. Seidman, 2012). Seidman (2012) describes these resources from the perspective of classroom settings: Social resources are people outside the social setting, such as social networks, that individuals within the setting can use; physical resources are materials, technology, physical space, facilities, and buildings; economic resources are financial expenses; temporal resources are the amount of available time; and human resources are students, personnel, and the characteristics of these individuals, including education, training, skills, cultural values, and beliefs. Human resources are the individuals within a setting and their characteristics, and economic resources are ways to securing other resources (Tseng & Seidman, 2007). Temporal resources can actually place boundaries on social processes (Tseng & Seidman, 2007). Critical to the importance of physical resources is how effectively they are used (E. Seidman, 2012).

The Organization or Resources

The ways in which people, space, and time are arranged and money is allocated constitutes the organization of resources in a setting (E. Seidman, 2012; Tseng & Seidman,

2007). This can occur either naturally or intentionally (Tseng & Seidman, 2007). The organization of resources may be more important to the ongoing social processes of a social setting than the resources themselves, and may also have more of an impact on setting inhabitants' daily social processes (E. Seidman, 2012). The way that individuals within a setting are grouped constitutes the social organization (E. Seidman, 2012). This may involve the degree of heterogeneity or homogeneity on a number of different factors, including socioeconomic status, race, and ethnicity (Tseng & Seidman, 2007). The way that time is schedule constitutes the organization of time, and the way resources are physically arranged constitutes the organization of physical resources (E. Seidman, 2012). Changing the configuration of resources within settings can change social processes, leading to different setting outcomes; therefore, these can serve as tools to create change for Community Psychologists and policymakers (Tseng & Seidman, 2007). For example, changing monetary resources can reduce stress, thereby changing social processes (Tseng & Seidman, 2007). Unfortunately, many of the approaches taken to altering the organization of resources do not successfully create significant change in the outcomes of settings. For example, policymakers often focus on changing the economic resources of a setting by changing the way that funds are allocated; however, this approach is unlikely to be successful unless the social processes within the setting are shifted (Tseng & Seidman, 2007). It is unlikely that outcomes within a setting can be changed significantly simply by changing resources or their organization; instead, it is likely that the social processes must be altered as well (Tseng & Seidman, 2007).

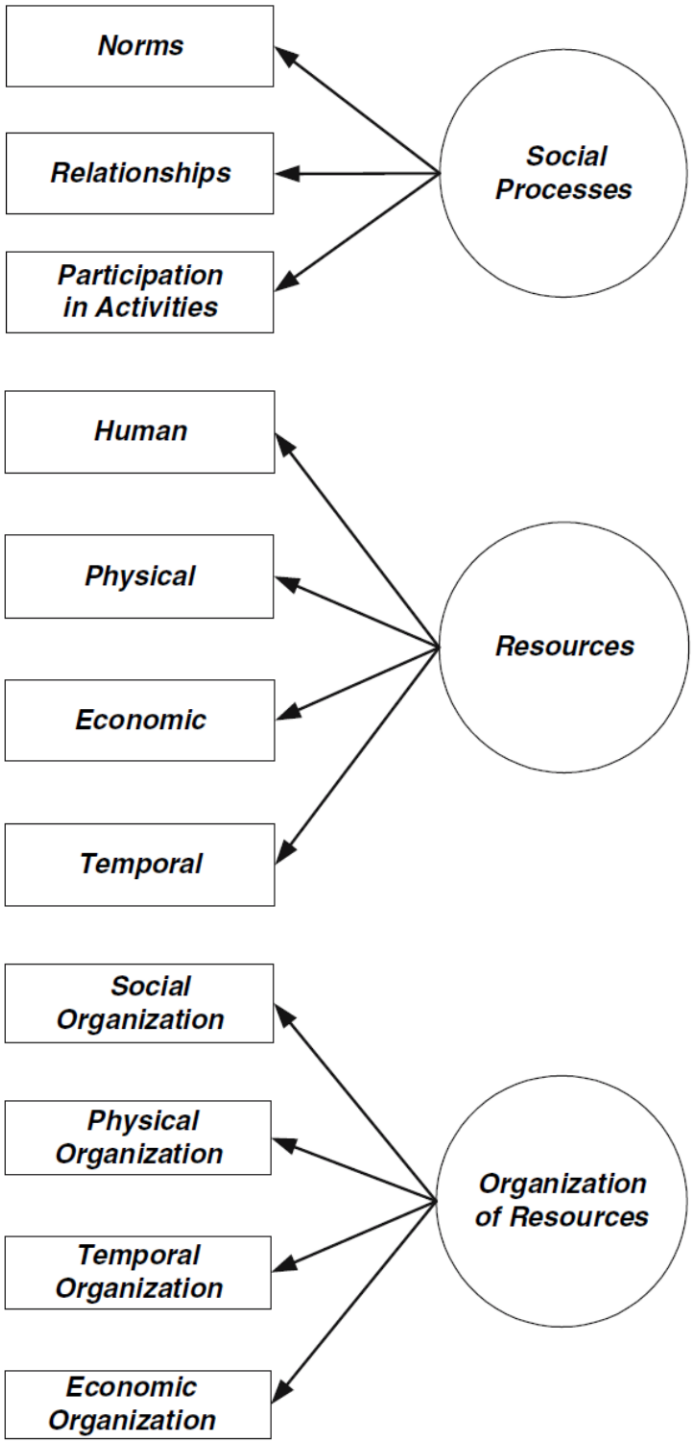

Figure 2.15. Social processes, resources, and organization of resources.

Creation of Alternative Settings

As an intervention strategy, alternative settings can be created to fill needs that are not met by existing organizations, often maintaining their distinctiveness over time (Cherniss & Deegan, 2000). Unfortunately, creating alternative settings can be a difficult and lengthy process with many potential issues, from the beginning stages all the way to after the alternative setting has already been in operation (Cherniss & Deegan, 2000). Additional difficulties can emerge from the external environment as well, thus requiring compromise with external entities (Cherniss & Deegan, 2000). Alternative settings may also become victims of their own success (Cherniss & Deegan, 2000). In the broader view, there are four limitations of using alternative settings as intervention strategies: They are limited in the number of individuals they can benefit, they do not necessarily generate the outcomes that are desired, they may diffuse responsibility to address issues from the larger community, and they can potentially divert away from changing existing settings (Cherniss & Deegan, 2000).

Cherniss and Deegan (2000) identify several guiding principles for creating alternative settings. The first guiding principle concerns external relations. Potential sources of conflict should be identified before they emerge (Cherniss & Deegan, 2000). Potential sources of conflict include: Already existing settings, as they are often competitors for scarce resources; Individuals who have been denied input in creating the alternative setting; and individuals who have had input in the process but did not have their input accepted (Cherniss & Deegan, 2000). The strategy suggested to overcome such conflict with and reduce resistance from external relations is to involve these individuals in the process as early as possible in concrete ways (Cherniss & Deegan, 2000). External relations may include potential allies as well; thus, it is advised to form

ties with other alternative settings which have similar goals and beliefs (Cherniss & Deegan, 2000).

The second guiding principle involves leadership, which is one of the most controversial issues in creating alternative settings (Cherniss & Deegan, 2000). The creation of alternative settings usually involves and is enhanced by the emergence of leaders, usually one dominant figure but no more than two or three, despite many alternative settings initially intending to be democratic and non-authoritarian (Cherniss & Deegan, 2000). This leadership is usually recognized at the very beginning or emerges early in the process as an informal leader (Cherniss & Deegan, 2000). To counter leadership issues, it is recommended that the presence of leadership and the possible issues associated with it is recognized, as there are many ways to address these issues once they are identified (Cherniss & Deegan, 2000).

Another guiding principle has to do with the planning process. Much of this process occurs a long time before the alternative setting is operational (Cherniss & Deegan, 2000). One issue that must be dealt with is the tendency to move through the problem exploration phase of the planning process and moving too quickly to deciding on solutions (Cherniss & Deegan, 2000). Alternative setting creators should take an appropriate amount of time to investigate both the problems that the setting is intended to address and possible solutions that can be implemented (Cherniss & Deegan, 2000). Another planning issue is the propensity for alternative setting creators to underestimate how long tasks in the process will take to be completed (Cherniss & Deegan, 2000). An extended planning period which does not have a set timeline can help alleviate this problem (Cherniss & Deegan, 2000). Other issues related to the planning process include: Fit between elements of a newly-created alternative setting, such as between goals and organizational structure or technology and structure; poor translation of

principles into concrete alternative setting structures; the socialization and training of setting participants; and resources (Cherniss & Deegan, 2000). As a general rule, the planning process should be approached carefully and thoroughly to ensure that the structure created for an alternative setting is appropriate (Cherniss & Deegan, 2000).

The final guiding principle concerns group dynamics; in particular, this involves overcoming conflict and ensuring commitment (Cherniss & Deegan, 2000). Internal alternative setting dynamics may emerge over time, which are both disrupting and contentious; for example, specialized subdivisions of setting participants often develop in alternative settings over time, resulting in the development of factions (Cherniss & Deegan, 2000). Factions may also develop in response to a major conflict (Cherniss & Deegan, 2000). Strategies for addressing these issues include focusing on how new setting participants are recruited, selecting adequate criteria for recruiting new setting participants in particular (Cherniss & Deegan, 2000). Formal rules and procedures can be helpful in increasing commitment and addressing conflict, as well as reducing factionalism (Cherniss & Deegan, 2000). There are a number of ways to deal with conflict; however, there is no single strategy that can be used to promote positive interaction and commitment because each alternative setting has its own unique set of circumstances (Cherniss & Deegan, 2000).

Health Promotion

Ensuring that healthy behaviors are the default behaviors by appropriately structuring neighborhoods, homes, and institutions is an ultimate goal of health promotion (Story et al., 2008). Health promotion has a number of distinctive features. It involves collaboration across multiple disciplines, and principles and strategies of health promotion can be applied to all domains of health (Green et al., 2000). Health promotion emphasizes public participation,

reducing social injustice, and reducing inequities (Green et al., 2000). It also seeks to address distal and proximal factors in health outcomes by providing concrete strategies for improving health at multiple levels of analysis, including individuals, organizations, and communities (Green et al., 2000).

Health promotion is flexible in the health issues it can address. Many health behaviors are inherently similar, and engaging in one provides relevant experiences for others that are closely related (Flay & Petraitis, 1994; Golden & Earp, 2012). Even if health behaviors appear different on the surface, they may share similar causes and may show a significant difference in the proximal factors which influence the behavior (Flay & Petraitis, 1994). This points to how related health behaviors can be addressed in the same intervention if careful attention is paid to the attitudes, social normative beliefs, and self-efficacy specific to each health behavior (Flay & Petraitis, 1994). Moderately related health behaviors have different proximal causes but similar distal causes (Flay & Petraitis, 1994).

Health interventions essentially target two sets of factors: Those which are in the control of the individual, and those which are not (Cohen et al., 2000). The specific changes that a program seeks to generate inform the level of the intervention (Golden & Earp, 2012). Thus, applying theories of health behavior to interventions to achieve optimal outcomes requires that practitioners decide on whether to target individuals, the environment, or both (Cohen et al., 2000). Interventions that target individuals are limited because they tend to focus primarily on individuals with the highest risk; as a result, those who are not within this risk group are usually not reached and thus not protected from becoming at risk themselves (Cohen et al., 2000). Instead of being guided by macro theories that are unified, integrated, and comprehensive, health interventions tend to be guided by various hypotheses and micro theories (Flay & Petraitis,

1994). There has been an increased emphasis on the role of the environment in influencing health behavior, particularly regarding eating behavior (Larson & Story, 2009).

Workplace Health Promotion Programs

Organizational settings provide excellent arenas for implementing health promotion programs. This is particularly true for the workplace, as full-time employees spend nearly half their waking hours and consume a significant amount of their daily food intake in workplace settings (Larson & Story, 2009). The organization of work can impact multiple health outcomes. Stress-related health outcomes, including cardiovascular disease, musculoskeletal disorders, and psychological disorders, represent one group of outcomes (Landsbergis, 2003). Another group of outcomes are related to the level of exposure to the physical hazards of an occupation (Landsbergis, 2003). Enhancing workplace health may require that work organization is improved in a systematic and sustained way (Landsbergis, 2003).

Workplace health promotion programs may engage in primary, secondary, and tertiary prevention (Goetzel & Ozminkowski, 2008). Primary prevention is directed at generally healthy populations of workers (Goetzel & Ozminkowski, 2008). Secondary prevention is directed at workers who are considered at high risk, whether because of unhealthy lifestyle practices or abnormal biometric measurements (Goetzel & Ozminkowski, 2008). Finally, tertiary prevention is directed at workers who already have existing health ailments; this is also called disease prevention, and it is designed to slow down or ameliorate the disease (Goetzel & Ozminkowski, 2008).

Workplace health promotion has a number of advantages. For one, workplaces contain a somewhat homogenous group of people, in regards to geographic, purpose, and culture (Goetzel & Ozminkowski, 2008). Worker and organizational goals are usually in alignment; thus, the

goals of health promotion are usually in line with the organization's mission, especially since improving worker health typically enhances an organization's profitability and helps the organization to achieve other goals (Goetzel & Ozminkowski, 2008). Another advantage is that organizational policies and norms can impact health behavior by encouraging healthy behaviors and discouraging unhealthy behaviors; in addition, incentives can be implemented by organizations to encourage worker participation in health promotion programs (Goetzel & Ozminkowski, 2008). One final advantage is that administrative data collection and analysis systems already present in organizations enhances impact evaluability of health promotion programs (Goetzel & Ozminkowski, 2008).

Goetzel and Ozminkowski (2008) point to seven "best practices" of workplace health promotion programs: They should be integrated into the core operations of the organization, they should address factors at the individual, environmental, policy, and cultural levels; they should target multiple health issues simultaneously; they should be tailored to the specific needs of the worker population; they should have high participation rates; they should evaluate impact; and they should effectively communicate program impacts to stakeholders.

As health promotion efforts in the workplace have grown, so have the criticisms of individually-oriented health behavior change efforts; fortunately, the workplace provides opportunities for both individually-oriented health behavior change, as well as social environment- and physical environment-oriented change (McLeroy et al., 1988; Story et al., 2008). In general, individuals can influence their environments most practically at the second order of organizational settings, such as at the workplace; however, this depends on both the scale of these settings and who controls these settings (Green et al., 2000). If effectively and widely implemented, environmental interventions at workplace settings can have a large impact

on the health of employees and the entire country, as well as provide a positive return on investment for corporate investment in such interventions (Pratt et al., 2007). Workplace health programs in general can improve worker health and productivity, decrease health care costs and health insurance premiums, and improve both the organization's competitiveness and its standing in the community (Baicker, Cutler, & Song, 2010; Goetzel & Ozminkowski, 2008). A recent metanalysis found that workplace health promotion programs were associated with a large positive return on investment, even within the first two years of these programs being in place (Baicker et al., 2010). Unfortunately, despite the numerous benefits, most organizations do not have large scale health promotion programs (Baicker et al., 2010).

Workplace health promotion programs hold the potential to impact obesity prevalence. For example, the foods served at the workplace affect everyone in that workplace (Booth et al., 2001). There are many sources of food in workplace settings. Sources may include cafeterias; vending machines; company-sponsored meetings, events, and fundraisers; shared kitchen space; and the area surrounding the workplace (Larson & Story, 2009). Organizational policies may also affect eating behavior, as they can impact important factors such as the time allowed for meals; foods served at company-sponsored meetings, events, and fundraisers; and stipulate incentives and time for employees participating in health promotion programs (Larson & Story, 2009). To encourage individual workers to engage in healthy behaviors, organizations should provide environmental supports (Goetzel & Ozminkowski, 2008). This can be accomplished by providing healthy food choices in company cafeterias, vending machines, and company-sponsored meals, as well as providing access to physical activity (Goetzel & Ozminkowski, 2008). Future worksite-based health promotion should address a number of elements, including: Providing sufficient time for workers to participate in these programs, isolating and eliminating

barriers to environmental and organizational change, addressing social contextual factors, and building and growing networks of community partnerships (Kruger, Yore, Bauer, & Kohl, 2007; Story et al., 2008).

Truck Driver Health and Health Promotion

Determinants of Truck Driver Health

An examination of the determinants of truck driver health is highly relevant to the truck driving occupation. Disparities exist between different occupational environments; however, the occupational environments of the trucking profession rank particularly low (Y. Apostolopoulos, 2012). Professional driving is linked to a number of negative health outcomes. One in particular is obesity, as a recent survey of drivers found that nearly 80% included in the study were either overweight or obese (Y. Apostolopoulos, Sonmez, Shattell, Gonzales, & Fehrenbacher, In Press). Drivers in general are unfit, which is influenced by the sedentary lifestyle endemic to the profession (Krueger, 2008). Driver health issues are further exacerbated by poor availability of healthy food and numerous stressors (G. P. Krueger, Belzer, et al., 2007). Health issues often force drivers out of the profession because they are unable to meet the legal physical requirements to operate a commercial motor vehicle (G. P. Krueger, Belzer, et al., 2007).

The factors that influence driver health are complex and occur at a number of different levels (Figures 16 and 17). These levels include individual and background factors, physical activity and eating behavior determinants, genetic factors, outcomes, the transportation environment, and the sociocultural context (Y. Apostolopoulos, Sonmez, Shattell, & Belzer, 2011).

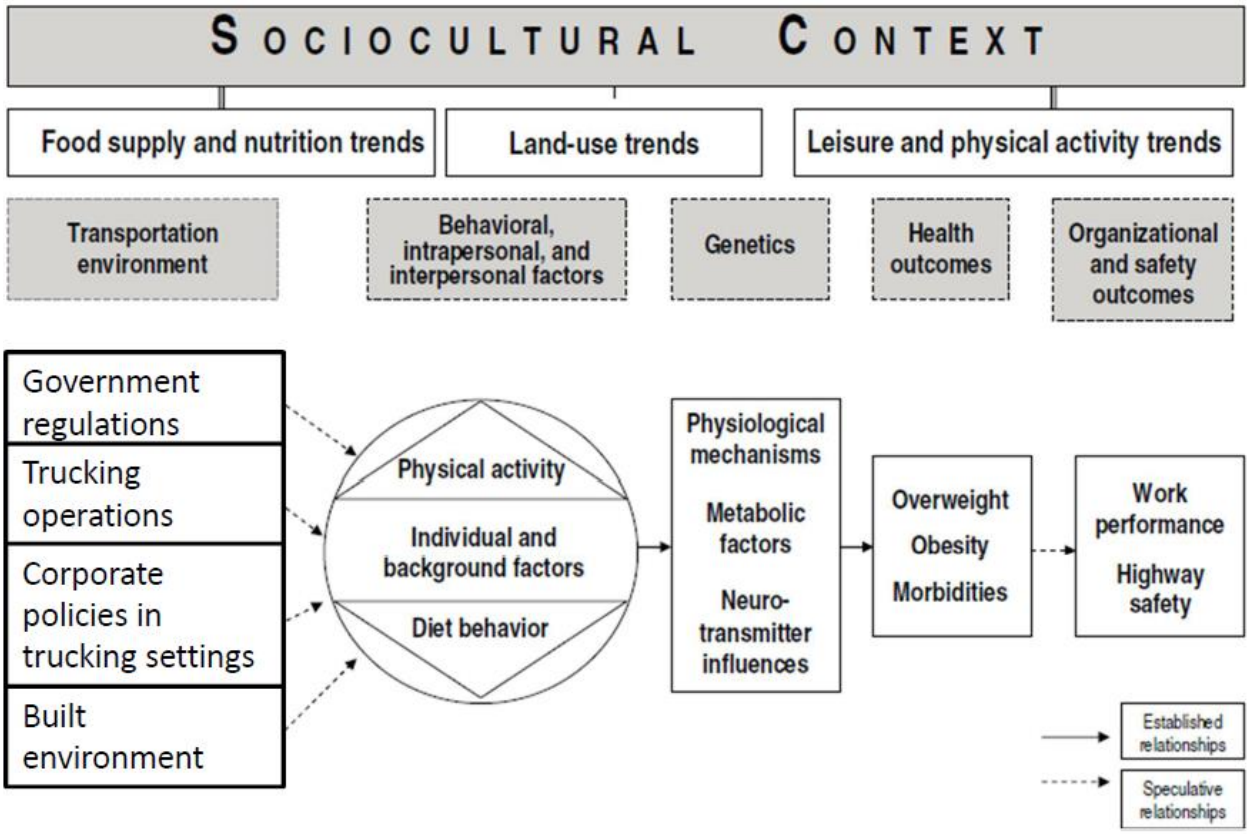

Figure 2.16. Ecological conceptual framework of the transportation environment and trucking obesity.

Variables	Operational Definitions
Sociocultural context	
. food-supply trends	. low fruit/vegetable intake, processed foods
. nutrition and eating-out trends	. food content, portions and frequency, fast food
. food marketing and pricing trends	. TV, nutrition labels, healthy food promotions
. physical activity trends	. TV, automobiles, PCs, community resources
. leisure-activity trends	. recreation space, health clubs, home entertainment
. urban and rural development trends	. land use, planning, zoning, public transportation
Transportation environment	
. government regulations	. deregulation, hours-of-service requirements
. trucking operations	. shipping, dispatching, scheduling
. corporate policies in trucking settings	. physical activity resources and food options
. built environment	. land-use design, truckstop layout, proximity
Individual and background factors	
. sociodemographics	. age, race, ethnicity, income, education
. behavioral factors	. alcohol and tobacco use, illicit substance use
. psychosocial properties	. social connectedness, social ties
. personal and family health history	. history of obesity risks and chronic diseases
. occupational factors	. work-related stressors, driver characteristics
. spatial and temporal attributes	. trucker pathways, itinerary, location
Physical activity determinants	
. self efficacy	. truckers' beliefs that they can perform activity
. perceived benefits	. expected positive health outcomes
. supportive environment	. support systems, social capital, networks
. attitude toward exercise	. cognitive and affective attitudes toward outcomes
. modeling	. learning a physical activity from others
. outcome expectancies	. likely outcomes from being physically active
Diet behavior determinants	
. attitudes toward eating	. views regarding healthy eating habits
. emotional distress	. stress, emotional eating, bingeing, comfort food
. time constraints and pricing	. both perceived and actual barriers
. peer pressure	. co-worker pressure to eat/acceptability of junk food
. junk-food addiction	. convenience/flavor of junk foods, eating while driving
. nutrition and diet knowledge	. information about healthy nutrition
Genetics	
. physiological mechanisms	. stomach emptiness/fullness, hunger, bloating
. metabolic factors	. nutrient and vitamin deficiencies, metabolic efficiency
. neurotransmitter influences	. effects of epinephrine, norepinephrine, dopamine
Outcomes	
. primary health outcomes	. overweight, obesity
. secondary health outcomes	. hypertension, hypercholesterolemia, obesity comorbidities
. other outcomes	. absenteeism, occupational hazards

Figure 2.17. Elements of an ecological conceptual framework of the transportation environment and trucking obesity.

At the highest level is the sociocultural context. The larger sociocultural context includes societal, governmental, and market forces that impact driver health behaviors by shaping resources, infrastructure, and individual access at trucker worksites (Y. Apostolopoulos, S.

Sonmez, M. Shattell, & M. Belzer, 2011). Three overarching factors in the sociocultural context which impact driver health are food supply and nutrition trends, physical activity opportunities and trends, and urban development planning and policies (Y. Apostolopoulos, S. Sonmez, M. Shattell, & M. Belzer, 2011).

Particularly important, and at the level below the sociocultural context, is the larger transportation environment, which includes economic, physical, social, occupational, organizational, and institutional components, as well as workplaces and the policies and regulations that govern them (Figure 18) (Y. Apostolopoulos, S. Sonmez, M. Shattell, & M. Belzer, 2011). Also within the transportation environment are government regulations, trucking operations, corporate policies, the built environment, and economic forces (Y. Apostolopoulos, S. Sonmez, M. Shattell, & M. Belzer, 2011). Trucking settings are included in this level. The transportation environment heavily impacts truck drivers' health (Y. Apostolopoulos, S. Sonmez, M. Shattell, & M. Belzer, 2011).

TE components	Main dimensions of TE components	What it means for trucking and truckers	Effects on trucker health
Government regulations	Pro-competitive economic regulation of trucking ("deregulation") and HOS provisions	Competitive carriers and labor markets; unionization decline; lower wages and benefits; poor working conditions; "sweatshop" environment produced by contingent compensation and precarious employment; HOS violations	Disrupted biological cycles; fatigue and sleep loss and metabolic strains; stress symptoms; sedentary lifestyle/obesity; CVD and diabetes risks; low wages linked with more crashes
Trucking operations	Logistics and market structure; TL/LTL carriers; hub-and-spoke system; terminals and warehouses; shippers and consignees	Segmented market with shippers holding immense bargaining leverage; harsh working conditions and long hours for drivers; lack of organization-based health promotion programs	Sedentary/stressful lifestyles; low physical energy, fatigue, and mental alertness; social isolation; eating while driving; headaches; respiratory/CVD risks; musculoskeletal disorders
Corporate policies in trucking settings	Overall infrastructure, conditions, resources, amenities, ergonomics of highways, truckstops, terminals, and truck cabins	Lack of exercise facilities; poor dietary options; unhealthy and inactive settings and few options; exposure to noise and fumes; constant vibration while driving; irregular and unhealthy dietary options; long and irregular working time	Obesity and high exposure to smoking/diesel exhausts are predictive of stroke, diabetes and other endocrine disorders, CVD, arthritis, back pain, and cancer risks
Built environment	Spatial and physical aspects of highways, truckstops, and trucking terminals (design, layout, pedestrian and walking services, access)	Efficient, safe, and healthy work settings; location, proximity, and accessibility of truckstops/terminals from/to community services/resources; availability, adequacy and quality of space that supports activity; social isolation	Sedentary lifestyle, limited access to healthier foods, and limited clean air with associated risk factors for obesity, CVD, diabetes, cancer, and other morbidities; higher risks of depression and suicide

TE=transportation environment; **HOS**=hours-of-service; **PA**=physical activity; **CVD**=cardiovascular disease; **LTL**=less-than-truckload; **TL**=truckload

Figure 2.18. Elements of the transportation environment.

Truck Driver Settings

Truck drivers operate in multiple settings, and the unique nature of the occupation makes these settings particularly relevant to driver health. Conventional workplaces classifications are not applicable to the trucking profession; thus, multiple locations and worksites can be considered trucking settings (Y. Apostolopoulos, S. Sonmez, M. Shattell, & M. Belzer, 2011). They include such diverse entities as truck stops, truck plazas, trucking terminals, warehouses, truck cabs, rest areas, and other highway facilities (Y. Apostolopoulos, S. Sonmez, M. Shattell, & M. Belzer, 2011). Because of the mobility of the truck driving occupation, drivers are particularly dependent on, and also vulnerable to, the milieus of these settings (Y.

Apostolopoulos, S. Sonmez, M. Shattell, & M. Belzer, 2011). Unlike other occupations, where workers return home at the end of their working day, truck drivers are away from their homes for weeks at a time, usually only getting home one or two weekends per month (Y. Apostolopoulos et al., 2012). Truck drivers spend much of their time in these settings when not working; therefore, trucking settings essentially become their homes when on the road (Y. Apostolopoulos et al., 2012; Y. Apostolopoulos, S. Sonmez, M. Shattell, & M. Belzer, 2011). When not driving, drivers carry out numerous activities in these settings, including eating, sleeping, resting, showering, doing laundry, fueling, socializing, shopping, completing paperwork, communicating with families and friends, and loading and unloading (Y. Apostolopoulos et al., 2012). Because of this, truck stop and trucking terminal policies, resources, and amenities have significant impact in the transportation environment on trucker health (Y. Apostolopoulos, S. Sonmez, M. Shattell, & M. Belzer, 2011). In addition, trucking company policies play out in these settings, further impacting driver health (Y. Apostolopoulos, S. Sonmez, M. Shattell, & M. Belzer, 2011). Truck stops are typically nationwide chains, operated by major corporations, which provide goods through their own convenience stores and restaurant chains, as well as through partnering with other major corporate franchises, such as McDonald's (Y. Apostolopoulos, S. Sonmez, M. Shattell, & M. Belzer, 2011). Access to goods and services outside of truck stops is restricted for professional drivers; therefore, they are a captive market for truck stop corporations (Y. Apostolopoulos, S. Sonmez, M. Shattell, & M. Belzer, 2011).

The transportation environment also impacts driver health due to psychosocial components. The psychosocial environment of the trucking industry contributes to obesity rates among drivers (Yorghos Apostolopoulos, Peachey, & Sonmez, 2011). Healthy behaviors, such

as physical activity and healthy eating, can moderate stress; however, the transportation environment does not support these behaviors (Yorghos Apostolopoulos et al., 2011).

The Built Environment of Trucker Settings

The built environment of trucker settings includes the physical and spatial aspects of truck stops, truck plazas, trucking terminals, warehouses, truck cabs, rest areas, and other highway facilities (Y. Apostolopoulos, S. Sonmez, M. Shattell, & M. Belzer, 2011). The critical features of the built environment in these settings includes the type, location, design, and layout; spatial distribution of activities; walkability; accessibility and location of community resources and services; aesthetics; and air and water quality (Y. Apostolopoulos, S. Sonmez, M. Shattell, & M. Belzer, 2011). To support healthy behaviors, the built environment should be efficient, comfortable, affordable, spacious, safe, and demonstrative of a healthy lifestyle; most importantly, they must allow and encourage truck drivers to consume healthy foods and engage in physical activity during non-work time (Y. Apostolopoulos, S. Sonmez, M. Shattell, & M. Belzer, 2011; Y. Apostolopoulos, Sonmez, Shattell, & Belzer, 2010).

Unfortunately, this is not the case as trucking settings, particularly truck stops, are notorious for being unhealthy, presenting numerous barriers to engaging in healthy behaviors (Y. Apostolopoulos, S. Sonmez, M. Shattell, & M. Belzer, 2011; Y. Apostolopoulos et al., 2010). Access to healthy food and physical activity are scarce, thus negatively impacting eating behavior and physical activity patterns (Y. Apostolopoulos, S. Sonmez, M. Shattell, & M. Belzer, 2011). Foods offered at truck stops are often deep-fried and high in sodium and fat (Y. Apostolopoulos et al., 2010). Trucking settings encourage sedentary behavior and restrict engagement in physical activity (Y. Apostolopoulos et al., 2012). These built environments seemingly collude with the psychosocial and physical strain that professional drivers experience,

which often generate coping strategies which negatively influence health behaviors (Y. Apostolopoulos et al., In Press). For example, drivers may conclude a long and exhausting work day by consuming large amounts of comfort food as a coping mechanism (Y. Apostolopoulos et al., In Press).

Lifestyle choices are relevant to the health status of truck drivers, as it is possible that individuals who are prone to lack of physical activity may prefer the characteristics of the truck driver profession (Dahl et al., 2009). However, these patterns appear to remain the same or are exacerbated by the nature of the trucking profession, as one study found that nearly 70% of truck drivers do not engage in regular physical activity (Y. Apostolopoulos et al., In Press).

Physical Activity and Healthy Eating in Trucking Settings

Apostolopoulos and colleagues analyzed trucker settings for their support of physical activity and healthy eating. In one study, drivers reported that fitness facilities were unavailable in over 70% of truck stops, almost 70% of trucking terminals, and 88% of trucking warehouses (Y. Apostolopoulos et al., In Press). In another study, they examined the environmental supports of physical activity by examining the natural environment, built environment, presence of resources and facilities that encourage physical activity, presence of exercise and fitness facilities that support physical activity, the health information environment, and the broader community, finding all of these were "not-at-all supportive of active living" (Y. Apostolopoulos et al., 2012). A third study conducted by Apostolopoulos and colleagues (2011) examined the environmental supports for healthy eating, looking at four domains: the healthy food environment, which includes restaurants/cafeterias, vending machines, convenience stores, break rooms, driver lounges, and picnic areas; the health-supportive social environment, which includes the organizational, social, and policy environment; the health-supportive community environment,

which includes areas surrounding trucking settings; and the health information environment, which includes health-related printed information. They found that all of these domains were "not-at-all supportive of healthy eating" (Y. Apostolopoulos, S. Sonmez, M. Shattell, L. Haldeman, et al., 2011). Based on these findings, Apostolopoulos and colleagues concluded trucking settings to be "active living deserts" and "healthy food deserts," helping to explain the poor health of truck drivers (Y. Apostolopoulos et al., 2012).

Health Promotion in the Trucking Industry

The truck driving profession remains underserved in terms of health promotion, as drivers reported that health promotion programs were unavailable in over 70% of trucking companies and almost 81% of truck stops (Y. Apostolopoulos et al., In Press). There are many reasons for this. For one, health promotion in the trucking industry has been hindered at the federal policy level. The Federal Motor Carriers Safety Association (FMCSA), a major regulatory and governing body of the trucking industry, continues to consider truck driver "lifestyle choices" to be the major health determinants, thereby ignoring the impact of the transportation environment and effectively removing responsibility from the transportation sector for poor driver health outcomes, placing the blame solely on the drivers themselves (Yorghos Apostolopoulos et al., 2011; Y. Apostolopoulos, S. Sonmez, M. Shattell, & M. Belzer, 2011). Individual factors are influenced by and are interwoven with the work and working conditions of the occupation (Dahl et al., 2009).

The determinants of driver health are complex; therefore, health promotion efforts in the trucking industry must account for the complexity and uniqueness of the trucking environment in its entirety to be effective and sustainable (Y. Apostolopoulos, S. Sonmez, M. Shattell, & M. Belzer, 2011). Ideally, health promotion for drivers must address multiple levels of influence

(Husting & Biddle, 2005). The framework of truck driver health determinants posited by Apostolopoulos, Sonmez, Shattell, & Belzer (2011) points to several determinants which may operate as either mediators or moderators of driver health, particularly obesity, by impacting physical activity and eating behaviors. The transportation environment in particular shapes, maintains, and limits truck driver health behaviors (Y. Apostolopoulos, S. Sonmez, M. Shattell, & M. Belzer, 2011). Because it is highly modifiable, it has the potential to support healthy behaviors (Y. Apostolopoulos, S. Sonmez, M. Shattell, & M. Belzer, 2011). Unfortunately, there is a dearth of research pertaining to the how the occupational environment of the trucking industry influences driver health and participation in health promotion programs (Y. Apostolopoulos et al., In Press). Providing opportunities for physical activity at corporate headquarters may not be adequate to address the needs of drivers, as they usually spend little time at these locations (Yorghos Apostolopoulos et al., 2011).

Health promotion should address the psychosocial environment of the trucking industry as well. Drivers' social support, control, and participation should be improved (Yorghos Apostolopoulos et al., 2011). Structural changes to the psychosocial environment are necessary as well, such as changes in scheduling, staffing levels, and the physical environment (Yorghos Apostolopoulos et al., 2011). Health promotion programs can be effective at truck stops and trucking terminals through increasing social support from other drivers, particularly in reinforcing healthy eating and physical activity (Y. Apostolopoulos, S. Sonmez, M. Shattell, & M. Belzer, 2011). Health promotion programs for truck drivers should be targeted, addressing both individual factors and occupationally-related factors; in particular, they should provide access to physical activity and healthy foods (Dahl et al., 2009). Ultimately, the transportation environment as a whole needs to be modified in order to create the magnitude of change

necessary for this disproportionally burdened population (Y. Apostolopoulos, S. Sonmez, M. Shattell, & M. Belzer, 2011). This will require a long-term cultural change in the trucking industry, shifting the responsibility for driver health from solely that of the driver to being shared between drivers, driver managers, and corporate leadership (G.P. Krueger, 2008).

There are numerous benefits of comprehensive driver health promotion programs to trucking companies, such as improved morale, lower driver turnover, lower health care costs, increased driver safety, and decreased accident risk; despite this, there are few health promotion programs in the trucking industry that adequately address driver health (G.P. Krueger, 2008). Few programs actually reach the drivers themselves, and they often have difficulty attaining desired participation levels from drivers because of lack of time due to their tight schedules (G.P. Krueger, 2008). Few trucking companies recognize the benefits that can accrue from implementing comprehensive health promotion efforts, and those who do support these efforts are still hesitant to describe their experiences with such programs (G.P. Krueger, 2008).

Summary and Purpose of the Research

Becoming a commercial motor vehicle (CMV) driver has been shown to have significant repercussions on an individual's health. Life expectancies are estimated to be between 55.7 and 63 years for commercial motor vehicle drivers, which is far below the average life expectancy of 77 years for an American male (CDC, 2006; Saltzman & Belzer, 2007). Obesity has a high prevalence rate in this population, with a recent estimate stating that 55% of drivers are obese (Martin, Church, Bonnell, Ben-Joseph, & Borgstadt, 2009). Elevated obesity rates endemic to truck driver populations have far-reaching implications. Health care costs for drivers who are obese are significantly higher: Obese drivers average $1,944 in annual health care costs, compared to $1,131 for normal weight drivers (Martin et al., 2009). Driver obesity is also

associated with diminished driver productivity, as well as increased absenteeism, presenteeism, driver turnover, and lost-time injuries, impacting revenues for trucking companies (Yorghos Apostolopoulos et al., 2011). Sleep-disordered breathing, a major contributor to driver fatigue which is linked to obesity, is also prevalent in this population, with one study finding that 59.6% of drivers had this disorder and 15.8% had obstructive sleep apnea syndrome (Howard et al., 2004). Obesity also appears be linked to increased frequency of accidents, thus coming at a high cost to the safety of the motoring public in general. One recent study indicated that drivers with a body mass index (BMI) above 35 have 47-63% higher crash rates than drivers with BMIs in the normal range (between 18.5 and 25) (Anderson et al., 2012). Truck driver obesity thus has far-reaching implications, negatively impacting the drivers themselves, their families, their companies, and the patrons of American's roadways.

In response to the accelerated obesity epidemic, a number of organizations affiliated with the trucking industry, including carriers, government organizations, trade associations, and truckstop companies, have initiated driver health and wellness programs to address the problem. Prevailing strategies within the trucking industry to address the significant problem of obesity are generally based on the individual, focusing on addressing lifestyle factors; in addition, they are usually reactive, relying on tertiary efforts to mitigate the impacts of obesity after they have already occurred (Y. Apostolopoulos, S. Sonmez, M. Shattell, L. Haldeman, et al., 2011). These programs are often underfunded, fragmented, and usually exist in "silos;" as a result, impacts on obesity rates are minimal, gaps exist between best practices and what actions are actually undertaken to address obesity, and key stakeholders that could be utilized to initiate change are excluded (G. P. Krueger, Brewster, Dick, Inderbitzen, & Staplin, 2007). One particularly daunting task in improving driver health, and one of the major failures in interventions up to this

point, is addressing setting-level barriers to sustaining healthy behaviors that are endemic to the trucking profession. These barriers are pervasive in trucking worksites, which include trucking terminals, warehouses, truckstops, and highway rest areas (Y. Apostolopoulos et al., 2012). Recent analyses of trucker worksites revealed they are unsupportive of healthy eating and physical activity and, thus, can be considered to be extreme obesogenic environments (Y. Apostolopoulos et al., 2012; Y. Apostolopoulos, S. Sonmez, M. Shattell, L. Haldeman, et al., 2011). Truckers' work and personal lives are inextricably linked in a way that is unique to the profession, as drivers spend nearly all of their time in some type of worksite (Y. Apostolopoulos et al., 2012). Developing a comprehensive understanding of how setting-level variables influence health behaviors is therefore a crucial step in significantly advancing driver health.

This issue extends beyond the trucking industry. In general, the term "health" is usually described using physical and individualistic terminology (Stokols, 1992). Most health promotion programs implemented in workplace or community settings have focused on modifying the health habits and lifestyles of individuals, instead of focusing on the environment (Stokols, 1992). Successful application of ecological models of health behavior holds the promise to engender sustainable, population-wide health improvement across a number of health behaviors. However, the basic premise in ecological models is that efforts to change individuals' behavior cannot be effective if environments make it difficult to choose healthy behaviors (Sallis et al., 2008).

Data gathered in this study may constitute an important first step in moving toward making healthy behaviors the default choice for commercial drivers. Insights gained from the current study may enhance our overall understanding of what aspects of environments make it difficult or easier to choose healthy behaviors, especially given the dearth of qualitative research

in this area. These insights may be beneficial in a broader sense, as ecological theory is an essential component to the basic paradigm of public health practice (Cohen et al., 2000). Strengthening this connection between commercial driver health and public health in a broader sense may open the door for future collaborations and partnerships with organizations such as the American Public Health Association, thus increasing the resources available to and visibility of the issue of commercial driver health. More specifically to the trucking industry, findings generated with this study may guide future interventions to address driver health which are more efficient, effective, and comprehensive by enhancing our knowledge as to how to best implement driver health and wellness programs. Because of the dominant influence of settings on health behavior, understanding how to modify the places where drivers spend the vast majority of their time to best support making healthy decisions is critical in making substantial improvements in driver health outcomes. Understanding environmental influences on driver health could serve as powerful levers for policy change, not only within trucking companies themselves but also other stakeholders, such as truck stop chains. Findings may also impact policy decisions at the federal level, including such agencies as the Federal Motor Carriers' Association, the Department of Transportation, and the National Transportation Safety Board.

The purpose of this qualitative phenomenological study is to discover the ways in which drivers are able to exhibit resiliency when confronted with these barriers and remain healthy while existing in endemically obesogenic environments. A parallel purpose of this study is to understand the setting-level barriers to engaging in health-supportive behaviors for truck drivers in their worksites. At this stage in the research, health-supportive behaviors will be generally defined as regular exercise and adequate nutrition, both performed regularly over the past three or more years. Remaining healthy will generally defined at this stage in the research as having a

healthy weight and being free of obesity-related disease, having maintained a healthy weight and remained free of obesity-related disease over the past three or more years. To address the purpose of this research study, four research questions will be addressed:

1) From the perspective of a truck driver, what is the essential structure of the experience of sustaining healthy behaviors in the context of extreme obesogenic worksite environments?
2) What resiliency factors do healthy truck drivers employ that allow them to overcome barriers to healthy living in their worksite environments and sustain healthy behaviors?
3) What barriers do healthy truck drivers overcome in their worksite environments to sustaining healthy behaviors?
4) What settings-level factors do healthy truck drivers believe should be changed to best support sustainable healthy behaviors?

CHAPTER 3

METHODS

Participants

Participants in this study were selected using purposeful sampling, using a criterion sampling technique. In particular, this study employed a technique described by Creswell called "purposeful maximum sampling;" this technique is also referred to as "maximum variation sampling" and is considered to be the most effective strategy for selecting participants for studies which involve interviews (Creswell, 2013, p. 100; I. E. Seidman, 1991, pp. 42-43). The goal of this sampling technique is to show different perspectives on the phenomenon by selecting participants that reflect the wide range in the larger population under study (Creswell, 2013, p. 100; I. E. Seidman, 1991, p. 43). In the current study, cases were selected which reflect a wide range of time of exposure to trucker worksites, as reflected by years of experience as a truck driver. In general, purposeful sampling was appropriate for exploring the phenomenon under investigation in this study, as generalizability is not an objective in studies which utilize qualitative research methods (Creswell, 2013, p. 101). The criteria for inclusion in this study were: 1) Employment as a truck driver over at least the past three consecutive years; 2) having maintained a healthy weight and remained free of obesity-related disease over the past three or more years; 3) regular engagement in physical activity, as defined by Healthy Workforce 2010 and Beyond as two hours and 30 minutes a week of moderate-intensity, 1 hour and 15 minutes a week of vigorous-intensity, or an equivalent combination of moderate- and vigorous-intensity aerobic physical activity ("Healthy Workforce 2010 and Beyond: An essential health promotion sourcebook for both large and small employers," 2009); and 4) having a healthful diet, as defined by consuming 2 cups of fruit and 2.5 cups of vegetables per day and limiting intake of saturated

fats, trans fats, cholesterol, added sugars, sodium, and salt ("Dietary guidelines for Americans, 2005," 2005).

Participants were identified using three means: 1) Contact with a key informant, who served as a gatekeeper and aided in establishing trust among potential participants and myself; 2) A social networking website (Facebook), which allowed the research to tap into groups of truck drivers dedicated to physical activity and nutrition; and 3) A snowball sampling technique, by asking participants at the conclusion of their interviews whether they were aware of any other drivers who fit the criteria for inclusion in this study. Participants were interviewed until reaching the two criteria for qualitative interviewing described by Seidman: Sufficiency and saturation (1991, p. 45). Sufficiency is reached when there is adequate data to reflect the range of participants that make up the population so that individuals outside the population may connect to the experiences of those inside of it (I. E. Seidman, 1991, p. 45). Saturation is reached when interviews no longer reveal anything new (I. E. Seidman, 1991, p. 45). Phenomenological studies typically employ small sample sizes, ranging from 10 to 15 (Creswell, 2013, p. 78). Sufficiency and saturation were achieved in this study following interviews with a total of 12 participants.

Each participant was given an informed consent form, which will be approved by Wichita State University's Institutional Review Board. The form described the purpose of the study, indicated any possible benefits and harm that may result from their participation, and identified the researchers involved in this study. It also indicated to the participants that they may end the interview at any point in time should they so choose. All participants received an electronic copy of the consent form through email for their review prior to the interview. Because the interviews were conducted by telephone, participants were read the informed consent form and

gave verbal consent, except in cases where drivers had access to the ability to sign and return the consent form electronically. To ensure confidentiality, interviews were only be conducted by the lead researcher. Confidentiality was also be maintained by storing the data on a password-protected database. Finally, drivers were given the option of providing an alias to further protect their anonymity.

TABLE 1

LIST OF INTERVIEWEES

Interviewee Name	Gender	Age	Marital Status	Average Miles Drive Per Week	Experience (in Years)
Sally Sue	Female	60	Single	2,500-3,000	41
Jeff	Male	42	Single	2,300	18
Cleo	Male	63	Married	Varies	13
David	Male	50	Married	2,000	11
Alley Cat	Female	53	Single	2,500	15
Douglas	Male	46	Married	2,600	17
Gene	Male	53	Married	3,000	25
Eugene	Male	31	Married	5,000 (team)	3
Pat	Female	46	Single	2,600	10
Scott	Male	43	Married	1,750	12
Jeff	Male	54	Married	2,300	25
Linda	Female	52	Married	2,800	9

Design

The researcher design used in this study is a qualitative approach called phenomenology. Phenomenological research seeks to produce descriptions of the meanings that constitute the activity of consciousness that are clear, precise, and systematic (Polkinghorne, 1989, p. 45). It seeks a deeper understanding of the meaning or nature of everyday experiences, attempting to gain insight into the way individuals experience the world without classifying or abstracting it (Van Manen, 1990, p. 9). Phenomenology affords the chance of achieving insights that bring us into more direct contact with the world (Van Manen, 1990, p. 9). Based on primarily interview data, the objective is to identify through the researcher's lens, what is perceived to be the central

underlying meaning of the descriptions provided by the participants. Phenomenological data analysis proceeds through the methodology of reduction, the analysis of specific statements and themes, and a search for as many meanings as possible. The end product is a descriptive passage, typically a paragraph or two in length, called the "essential, invariant structure," which is a composite description that represents the phenomenon under investigation (Creswell, 2013, p. 82).

The specific phenomenological approach that was used in this study is transcendental phenomenology. In this approach, the researcher seeks to generate a study that is as free as possible from preconceptions, beliefs, and knowledge of the phenomenon, whether these stem from prior experience or knowledge of previous studies (Moustakas, 1994, p. 22). The goal is to be receptive and naïve in listening to participants describing their experiences with the phenomenon, and this is achieved by the researcher engaging in a systematic and disciplined effort to set aside any pre-existing judgments regarding the phenomenon under investigation (Moustakas, 1994, p. 22). In this study, bracketing was conducted through note-taking and memos. During interviews, the primary researcher took notes about his judgments, interpretations, and possible biases or assumptions. These notes were then incorporated into memos for each interview, which were used to ensure trustworthiness of the interpretation of the data analysis. These memos created a detailed record of judgments, interpretations, biases, and assumptions, thus increasing reflexivity during the data analysis and interpretation. Further, a second coder was employed during the data analysis and interpretation process, who worked with the primary researcher to ensure as much as possible that biases did not contaminate the data analysis. A more detailed explanation of this process is included in the "Trustworthiness" section of the results section.

Data was collected through in-depth interviews with participants. Interviews lasted between one and half to three and a half hours, with an average duration of approximately 2 hours. Participants were also be solicited at the conclusion of the study to establish the validity of the findings and interpretations of the study; this procedure, known as member checking, is considered to be essential in establishing credibility and is described in further detail in the "Trustworthiness" section of the results section (Creswell, 2013, p. 252).

A phenomenological approach was chosen to address the research questions in the present study for several reasons. First, phenomenological research affords an in-depth understanding of the meaning of the experience of the individual, which, according to the philosophical assumptions of this line of research, constitutes the reality of the object (Creswell, 2013, p. 78). In other words, how truck drivers actually experience their settings is of principal importance, and it is only through this qualitative approach that it is possible to access these meanings. Second, there are few qualitative studies in the literature around this topic, and none using a phenomenological approach. Thus, the current study provided unique insight into the experience of truck drivers operating in extreme obesogenic environments. Third, the findings generated from this study may be of pragmatic use. Gaining a deep understanding of how truck drivers experience their worksite settings has the potential to help inform future interventions to address driver health and wellness. Finally, obtaining an in-depth understanding of the essential structure of sustaining healthy behaviors in extreme obesogenic environments offers understanding which can be extended beyond truck driver health and wellness, such as broader issues around workplace wellness and public health.

Instruments

Participant Interviews

Participant interviews were guided by research questions which were developed to enhance understanding of settings-level influences on health behavior. The research questions were divided into three domains: A central question, which is the broadest question possible to address the research problem; issues subquestions, which further refine the central question; and topical subquestions, which address topics needing attention (Creswell, 2013, pp. 138-142). The central research question was: From the perspective of a truck driver, what is the essential structure of the experience of sustaining healthy behaviors in the context of extreme obesogenic worksite environments? There were two issue subquestions: What resiliency factors do healthy truck drivers employ that allow them to overcome barriers to healthy living in their worksite environments and sustain healthy behaviors, and what barriers do healthy truck drivers overcome in their worksite environments to sustaining healthy behaviors? Finally, there were two topical subquestions: What behaviors or strategies do healthy truck drivers use that unhealthy drivers do not, and what settings-level factors do healthy truck drivers believe should be changed to best support sustainable healthy behaviors?

Procedure

Participant Interviews

The phenomenon of interest being studied is truck drivers' experiences of sustaining healthy behaviors in the context of extreme obesogenic worksite environments. First, the process of bracketing was employed. This is the where the focus is placed solely on the topic and question by setting other factors, including personal experience of the researcher, aside (Creswell, 2013, p. 83; Moustakas, 1994, p. 97). In the current study, this process was

particularly important. The lead researcher is a former truck driver with five years of experience, as well as having an extensive knowledge of the existing research literature relevant to the phenomenon under investigation. Therefore, it was particularly important in using the transcendental phenomenological approach that these experiences and knowledge be removed as much as possible from this study.

The interview guide was piloted. Piloting offered several advantages, including drawing attention to questions and interview techniques which support or detract from the objectives of the study, detecting whether the research design is appropriate for the study, and familiarizing the interviewer with the practical aspects of the interview process, such as gaining access, establishing contact, and conducting the interview (I. E. Seidman, 1991, p. 30). Potential participants were identified and contacted to determine if they met the criteria for the study and whether they have interest in participating. If both these conditions were met during initial contact, typically determined through messages via Facebook, the participant had the informed consent form emailed to them to be reviewed prior to the interview. Participants were then interviewed via telephone. At the beginning of each interview, the researcher reviewed the consent form with the participant, making sure that the participant understood everything in the form. Oral consent was then provided by the participant. This was the most pragmatic approach to conducting the interviews, as this population is highly mobile, and participants were dispersed across a wide geographic region. Participants were asked to be parked in a safe location during the interview to protect against any harm that could potentially arise should they have decided to conduct the interview while driving. Interviews were recorded electronically.

Data Analysis

Phenomenological methods recognize and seek to describe the intrinsic relation of the person to some subject matter. Use of the interview sought to uncover the central description of the barriers to engaging in health-supportive behaviors for truck drivers in their worksites. Furthermore, the interview sought to uncover the manner in which drivers exhibit resiliency when confronted with these barriers and remain healthy while existing in these endemically obesogenic environments. Analysis followed a modification of the method advanced by Moustakas (1994, pp. 120-121). First, using the transcripts from each interview, every expression relevant to the experience was listed. Second, the process of reduction and elimination was employed, where key statements were determined based on two criteria: Whether they contained a moment of experience that is necessary and sufficient to understand the experience, and whether it was possible to abstract or label the statement. Statements not meeting these two criteria were eliminated. Following the identification of key statements, codes, or "meanings," were derived from each key statement, with the help of a second coder. Key statements were then clustered into themes using their meanings. These clustered key statements and their meanings formed the core themes of the experience. Following this step, subthemes were identified within each of the thematic clusters. Finally, a composite description of the meanings and essences of the experience that represents the group of participants as a whole was developed. This was the essential, invariant structure.

Recordings of interviews were transcribed using the method suggested by Carlson (2010), in which the extent of transcription necessary is considered. For this current study, only sections of the interview that were related to the analysis were transcribed. Interview sections that were excluded were primarily rapport-building dialogue unrelated to the study. Filler words

were also excluded (i.e. "um," sentence fragments, and false starts), and minor grammatical errors were corrected in the transcripts. Carlson (2010) describes the potential for embarrassment or even withdrawal of participants if they are presented with purely verbatim transcripts, and thus it was important to avoid such outcomes during the member checking process.

Trustworthiness

Four techniques were employed in this study to ensure the trustworthiness of data analysis. The first technique, bracketing, involved clarifying researcher bias from the beginning of the study. Particularly in the current study, a transcendental phenomenology, bracketing is critical in ensuring the trustworthiness of data analysis. The researcher in this study is a former truck driver with nearly five years of experience, and therefore has a great deal of relevant experiences to the phenomenon under investigation. The bracketing process required ongoing measures throughout the course of data collection and analysis to ensure reflexivity and counter bias. The other three methods for establishing trustworthiness – note-taking and memoing, intercoder agreement, and member checking – were used in the same spirit of ensuring reflexivity and countering bias.

Note-taking was done during interviews, and memoing was done after interviews. During the course of interviews, the researcher recorded judgments, interpretations, biases, and assumptions by hand. These notes were later used in the creation of memos for each interview, which described the interview setting, descriptive notes, and reflective notes. These two processes helped to provide reflexivity by documenting judgments, interpretations, biases, and assumptions of the researcher in vivo during the interview. The researcher then was able to

reference these documents during data analysis and interpretation to further strengthen reflexivity in the current study.

Intercoder agreement was an important aspect of the data analysis and interpretation process. Four second coders were employed in the analysis of this data. None of the second coders had experience with the phenomenon under investigation. One second coder per interview reviewed and developed meanings independently from the key statements, blind to the meanings developed by the lead researcher. The second coder and lead researcher then convened and developed consensus meanings for each key statement.

Following data analysis and interpretation, the process of member checking was employed, where the researcher solicits feedback from participants regarding the credibility of the findings and interpretations reached (Creswell, 2013). Four participants from the interview, representing an array of the characteristics described in Table 1, were emailed the essential, invariant structure that was derived following the analysis and interpretation of the interview data. Participants were essentially asked whether the essential, invariant structure matched their own experience with the phenomenon under investigation and, if it did not, to provide feedback regarding errors in the interpretation. Agreement with participants provided assurance that the macro interpretation of the interview data was congruent with their diverse array of experiences, constituting a powerful form of validation.

CHAPTER 4

RESULTS

The total amount of data of the twelve transcripts equaled 114,058 words. From these transcripts, 1,391 key statements were identified, and 1,600 consensus meanings were derived from these key statements. Meanings were assigned to each key statement, which were then developed into 7 themes, and 54 subthemes were constructed under each main theme. A summary of the 7 themes are provided in Table 3 below. Finally, the essential, invariant structure was derived.

TABLE 2

THEMES

Category	Theme
1	Access to Health Resources
2	Barriers to Health Behaviors
3	Recommended Alternative Settings
4	Constituents of Health Behavior
5	Motivation for Health Behaviors
6	Attitude toward Health Behaviors
7	Trucking Culture

Theme 1: Access to Health Resources

The first theme was labeled "*Access to Health Resources*" and was composed of 371 meanings, grouped into 12 subthemes. Meanings included in this theme were oriented around resources that are available to drivers who have been able to be healthy over a sustained period of time and were valuable to them as they sought to engage in health-supportive behaviors. These resources include those available in or near the settings that are most commonly visited by drivers, as well as being able to take advantage of job characteristics, technology, available time, flexibility, and alternate means of transportation to acquire or use health-supportive resources.

Truck Stops

The subtheme "*truck stops*" consists of 77 meanings. Participants identified a number of resources available at truck stops; specifically, participants pointed to the TA/Petro chain as a leader in providing health-supportive resources; who "are doing a really good job on the exercise part." However, providing healthy food was "still really lacking and has got a huge amount of room to go." This trend was explained by one driver:

> "They don't call themselves truck stops anymore, they're travel plazas, and they want to get the RV crowd as much or more as they want as anyway. The RV crowd has got more money. But one of the good things about that is they are actually paying a little more attention to the food."

For healthy food, participants cited the progress made in improving the quality, expense, variety, and visibility of healthy food at truck stops. Specifically, participants pointed to more fresh fruit offerings in truck stop convenience stores than in the past. Truck stop sit-down restaurants are valuable sources of healthy food as well, with increased healthy menu choices, improved variety, and enhanced labeling of healthy options, including nutritional information or special designators. Truck stop restaurants are also more flexible in accommodating to special demands of customers. Buffets at truck stops also provide variety and quality healthy food, including fruits and vegetables. Fast food restaurants in truck stops are also resources for healthy food, with participants citing healthy menu choices and adequate nutritional information at these locations. Drivers have played a role in advocacy in ushering in these changes:

> "We are actually working with these restaurants who actually bring more healthy food into the menus. Letting them know they need to advertise it. Right now you'll see a lot of the basic food that truck drivers like to eat – chicken fried steak, blah blah blah. That's what they want, but if you look at their menus you'll see the other offerings on them."

Truck stops can also provide opportunities for exercise. In particular, TA truck stops were cited as leaders in providing exercise, including gyms, walking trails, basketball courts, and

a program called the President's Challenge. Participants cited how TA "has bent over backwards," how they "are doing a great job," and "it is amazing to see that." Many of these facilities are free, well-advertised, and of sufficient quality. Another valuable resources are the provision of maps of areas where drivers can walk or ride their bikes, both at the truck stops themselves or in surrounding areas. Truck stop employees also were mentioned as sources of information for opportunities for exercise

Several participants distinguished between independent truck stops and chain truck stops in their ability to offer health-supportive resources. Independent truck stops were said to "have a lot more to offer in terms of health" and provide better quality food; specifically, their restaurants provide more healthy items on their restaurant menus, fresher ingredients, and more locally-produced products. Independents also provide safer parking and cleaner facilities than chains. As one participant explained it:

> "A one-location truck stop is going to be more receptive and adaptive to the needs of its driver customer base than a chain would that has 200 locations. It would take an awful lot of adaptation on the part of the 200 locations to accommodate that."

Truck Cabs

The subtheme "*truck cabs*" consists of 81 meanings. Participants identified a number of resources available in or around their truck cabs. Truck cabs are the environments which can be most easily modified by drivers in a number of ways to provide access to healthy food and exercise. One driver described how it was possible to "personalize it and make it the way that I want it."

Truck cabs provide access to healthy food by provide a way for drivers to "stock up" on healthy foods. This was a strategy used by drivers to avoid consuming unhealthy foods, both by not keeping such foods in the truck and by reducing temptation to consume unhealthy foods

outside of the truck, such as in a truck stop. Drivers will often stock up on healthy foods during time at home and store them in their trucks. Drivers will also keep healthy snacks on hand.

Truck cabs also provide resources for eating healthy meals. Several participants mentioned how they will pre-prepare meals during time at home and take these meals on the road with them. A key resource in truck cabs for having access to healthy meals are in-truck accessories. One participant descried how "there are so many options out there now; you can carry so much more stuff." Another driver described truck cabs as being "great these days," and how "you can get 12-volt anything now." Microwaves and refrigerators were mentioned as being particularly important. One participant said that, "Having a fridge is so crucial, I cannot overstate that enough." Another said that having a microwave "makes it better for somebody who chooses to live a more healthy lifestyle…it just opens up a lot more possibilities." Other useful appliances for eating healthy include crock pots, George Foreman grills, mixers, and rice cookers.

Truck cabs also were described as providing access to exercise. Several drivers mentioned exercise equipment available for use in the truck cab itself, including the FIT workout system. Other drivers mentioned doing Zumba, dancing, and doing exercises while driving. Drivers also were able to have the passenger seat removed to facilitate storing a bicycle or to even have a stationary bike installed. Stated advantages of exercise in the truck cab were convenience, privacy, and ability to better control workout environment. Drivers also viewed their cabs as being resources in their ability to store exercise equipment. Running shoes, bicycles, stationary trainers, weight benches, and even pets were types of exercise equipment mentioned. The outside of truck cabs also were a resource for a specific exercise regimen which includes pull-ups, step-ups, and squats using handles and steps along the outside of cabs.

Company-Operated Terminals

The subtheme "*company-operated terminals*" consists of 17 meanings. Participants identified several resources available at company-operated terminals, which are facilities operated by their companies. One important resource are company vehicles, which drivers are able to borrow and use to access healthy food or nearby gyms. Company-operated terminals provide healthy food, including fresh fruit and healthy choices in vending machines. Company-operated terminals also provide gyms, showers, and safe places to walk, run, or ride a bicycle. One participant mentioned access to an extensive bicycle trail from a terminal.

Warehouses

The subtheme "*warehouses*" consists of 17 meanings. Participants identified a number of resources available at or near warehouses for exercise. Several participants cited their ability to run, walk, or bicycle around warehouses, industrial parks, nearby neighborhoods, and nearby paths. Warehouse lots were also mentioned as more sanitary than truck stop parking lots. Critical to warehouses being resources are the degree of flexibility and support offered. Warehouses which have more loose security, allow overnight parking, loaded and unloaded promptly, and had staff which were willing to make arrangements with drivers to accommodate exercise were perceived as more valuable resources for exercise. As one driver described it:

> "I've had some of them that, if they've told me it's going to be awhile before I get loaded…I usually just work with them on dropping off my trailer, and I'll bobtail somewhere where I can get my bike out and go ride, or if it's a fairly decent area where I'm at I'll take my bike out and go ride there. There's times I'll leave the truck at the dock and they'll just load it at their convenience and I might be gone for 3 or 4 hours riding my bike, and then I'll come back."

Rest Areas

The subtheme "*rest areas*" consists of 9 meanings. Participants identified a small number of resources available at highway rest areas, which focused on exercise. Rest areas were mentioned as having trails, which drivers used to walk or run. Rest areas also were viewed as being safe for walking and running, as there are fewer traffic concerns than other settings, and as well-lit.

Nearby Exercise

The subtheme "*nearby exercise*" consists of 17 meanings. Participants identified a number of resources available for exercise that are either truck-accessible or accessible from trucking settings, such as truck stops. These resources included finding gyms on the road, as well as places to walk, run, or ride a bicycle, including neighborhoods, trails, road shoulders, state parks, or even bike rental programs in certain cities. Drivers mentioned using their job to their advantage in finding novel nearby places to exercise:

> "The truck has helped me to get to places that I would not otherwise be able to get to. I've ridden trails to where if I only worked in Dallas, only in the DFW area, I never would have ridden through…I never would have ridden these obscure trails that I've read about."

Nearby Healthy Food

The subtheme "*nearby healthy food*" consists of 14 meanings. Participants identified a number of resources available for healthy eating that are either truck-accessible or accessible from trucking settings, such as truck stops. A major resource for finding healthy food are truck-accessible grocery stores, particularly Wal-Mart. Drivers also mentioned how familiarity with these locations played a key role, and one driver stated, "if you're an over-the-road truck driver, you know where most of the Wal-Marts are." Drivers also sought locations such as farmers' markets and local meat markets. In addition to grocery stores and markets, drivers would seek

truck-accessible restaurants which had healthy and affordable menu options, and how these locations would enable a driver to "be fat and happy and content walking out of there after eating healthy, and you won't spend a lot of money either."

Company/Job Characteristics

The subtheme "*company/job characteristics*" consists of 30 meanings. Participants identified a number of resources available as a result of their company or the characteristics of their job. Some companies were cited as providing resources for exercise for their drivers, including exercise equipment at company-operated terminals and in truck cabs, as well as discounted health club memberships. Another company resource were dispatchers, which could be an asset in accessing resources by allowing drivers to choose loads. Job characteristics that were resources for exercise were running flatbed trailers, which require more strenuous work, including having to strap and secure loads, as well as drivers having to load and unload freight. Another important job characteristic was a drivers' route – drivers who had regular or familiar routes were able to know the resources available for both healthy eating and exercise along that route and were able to create trip plans to take advantage of these resources. This can be critical; as one driver explained, "I don't like venturing off in my truck into new places, a new place to get stuck or anything."

Technology

The subtheme "*technology*" consists of 47 meanings. Participants identified technology as a resource, particularly for finding access to healthy food and exercise. Drivers mentioned gaining access to healthy food and exercise by using GPS, smartphone applications, Google satellite view, Google maps, websites, and even calling locations to inquire about truck accessibility. Other valuable uses of technology for access to exercise include a variety of

Facebook groups which provide information exchange and networking for finding places to run, bicycle, and walk, as well as gym locations that are truck-accessible. Using technology for social networking also enabled drivers to gain motivation and social support, and even meet up with other drivers on the road to go on runs or bicycle rides. Drivers praised the impact of technology, stating that "it kicks ass," and that "the Internet makes it just a cinch these days." One driver mentioned a website's program, called Couch to 5K, and he said that "it probably saved my life."

Time Management

The subtheme "*time management*" consists of 38 meanings. Participants identified time, when properly managed, as a resource in accessing exercise and healthy food. The trucking profession itself was cited as being advantageous for time to exercise. One driver explained, "I'm away from the daily grind of all that stuff [family], so whenever I have time off I actually get real time off." Another driver explained, "I drive a truck around the country, so if I start using it to my advantage I get actually more time in some ways than other people do." Drivers saw the hours-of-service (HOS) rules as a time management opportunity to get in exercise, and were able to schedule exercise within their mandatory breaks, particularly within the 10-hour and 30-minute breaks. Drivers also worked to take advantage of free time in their schedule, fit exercise into their routines, and exercise during down times or detention times. One driver described a recent opportunity:

> "Yesterday, we were stuck in Boston, so rather than wasting our time we got out and walked. We probably walked several miles but we were doing stuff. We were shopping and checking stuff out."

A critical part of time management was planning ahead for exercise and healthy food. One driver stated that, "If you are a halfway decent truck driver, you damn well better know how

to plan things. You certainly need to be able to plan out, 'Ok, I need to be able to buy this and this and that to be able to have food in the truck until I can get to another place to get food.'" Proper trip planning was indicated as an important part of this, as drivers mentioned accessing healthy food and exercise as key considerations during the trip planning process.

Flexibility

The subtheme "*flexibility*" consists of 12 meanings. Participants identified the ability to be flexible and adaptive as they sought health-supportive resources. There were two key elements indicated as important to this flexibility. The first was the will to seek out and find access to healthy food and exercise, which was accomplished by actively looking, exploring, or even finding new places by accident. One driver described a recent discovery she made:

> "Usually it's by accident that we find stuff. I ended up in Harrisburg, Pennsylvania, and I was walking around, and I found the Appalachian Trail. It's ¾ of a mile from the Flying J. So I walked along the Appalachian Trail there, which was just a thrill."

The other key element indicated by participants was the ability to be creative. Drivers mentioned being creative with finding ways to exercise, as well as finding ways to prepare healthy food on the road in novel ways.

Transportation

The subtheme "*transportation*" consists of 12 meanings. Participants identified modes of transportation other than by truck that they were able to use to access healthy food and exercise. Drivers mentioned using personal vehicles and public transportation. Drivers also mentioned using exercise to access healthy food. One driver, who follows a vegan diet, described: "I have saddlebags on [my bike]. So, I can load that sucker up with many pounds of produce or whatever groceries." Drivers described using forms of exercise, particularly bicycling, to access grocery stores, farmers' markets, restaurants, and gyms that are not truck-accessible.

Theme 2: Barriers to Health Behaviors

The second theme is labeled "*barriers to health behaviors*" and is composed of 416 meanings, grouped into 11 subthemes. Meanings included in this theme reflected the challenges and barriers that drivers perceive as they seek to engage in health-supportive behaviors. These barriers include those available in or near the settings that are most commonly visited by drivers, as well as other barriers related to accessing healthy food and exercise, time management, company/job characteristics, individual characteristics, and the overall trucking culture.

Truck Stops

The subtheme "*truck stops*" consists of 142 meanings. Participants discussed barriers to engaging in healthy behaviors in truck stop settings. Truck stops were viewed as being inconsistent in their health resources, with many locations offering little or no resources.

Participants described the food environment as generally unhealthy, with one participant stating that truck stops "actually increase driver's bad health because of the lack of good food." Participants described a lack of promotion, advertising, and visibility of healthy food options, as well as misleading advertisements, paralleled by active promotion and advertising and high visibility of unhealthy food options. As one driver described it:

> "Right where the salads are, right above it, are huge slices of pizza…Three bucks, or two for $5, that's the deal. When you get a sale on two slices of pizza, you are going to grab that instead of the four dollar salad that's below it."

Contributing to these issues are a perceived lack of motivation on the part of truck stops to promote healthy food options due to the high profitability of unhealthy food options and lack of demand for healthy food options from drivers. Truck stop chain Pilot/Flying J was believed to be particularly inadequate in offering healthy food options.

Healthy food options at truck stops were also described as lacking in variety, being of poor quality, lacking freshness, and being improperly prepared. One driver mentioned how, "At truck stops, there is poor sanitation and poor food control. I've gotten food poisoning several times." Healthy food options were also perceived to be overpriced, especially compared to the unhealthy food options; for example, one driver suspected that "a lot of people notice that those things are horrifically overpriced." Unhealthy options were described as being more convenient and in excessive portions. In the words of one driver, "On the truck stop side, I don't know what their motivation would be. They are just trying to sell stuff, and preferably sell stuff that they can make more money on."

Several barriers to engaging in physical activity were identified by participants as well. Safety was a barrier, including truck stops being in bad areas, attracting "more of a seedy bunch," and lacking regard for pedestrian safety, particularly at night. Sanitation was also cited as a barrier, due to "drivers taking a piss in the lot." Participants talked about the scarcity of fitness facilities, particularly at Pilot/Flying J locations. In contrast, one participant described one antithetical program in place at one truck stop:

> "Somebody called me last week up in Virginia. One of the Petros has a shuttle that comes around and picks you up in the parking lot. I said, 'You got to be kidding me, you can't walk?'…I was like, 'And drivers can't walk, that they have to have somebody come around and pick them up? Wow.'"

Participants described how, even when truck stops provided fitness facilities, barriers existed in using them to engage in physical activity. Truck stop gyms were believed to be too minimal, poorly maintained, expensive, and falsely advertised. In terms of the lack of equipment, a participant mentioned how he had "actually asked [a truck stop] about it, and…the liability is too high." Truck stop trails and walking paths were thought to be too short, boring,

poorly connected, and have poor wayfinding signage. One driver described a recent experience he had with his wife using the walking paths provided at a truck stop:

> "We were in Denver. The TA advertised mapped out a walking trail. I went out and did that for my jog. It was a mile and a half. I did it about 3 or 4 times. It was just like an industrial square. It was just factories and stuff, not a problem really. Except my wife, she decided to go the other way to find stuff on her own, and she found parks and an outdoor mall and new sidewalks and stuff to look at. A place where you'd actually want to be. While I was jogging around trucks and broken down cars. It was comical. They took the effort to map out this walking trail, and in order to get to it you had to walk a road. They didn't have a sidewalk or anything."

Truck Cabs

The subtheme "*truck stops*" consists of 30 meanings. Participants identified barriers to engaging in healthy behaviors in truck cabs. Truck cabs were thought to be difficult to design beyond the norm in general, and many have distractions such as TVs that distract drivers from engaging in health-supportive behaviors.

Participants described barriers in truck cabs to healthy eating. Lack of cooking accessories were cited as making it difficult to prepare healthy meals in the truck – "You live in the truck and have limited capacity," stated one driver. Accessories were thought to be expensive and of poor quality, and drivers mentioned how some companies do not allow certain accessories in truck cabs. Lack of space for accessories was also mentioned, as were issues related to not having a regular truck assigned. Drivers also talked about how healthy food kept or prepared in truck cabs is unappealing. "It's just hard for me to stuff [vegetables] in my mouth all day long" said one driver, and another believed that, "If you want a proper meal, then you basically have to pay somebody else to do it for you." Another barrier to healthy eating in truck cabs was difficulty keeping them stocked with healthy food over the duration of time on the road.

Drivers also stated various barriers to engaging in physical activity related truck cabs. Inefficient use of space in truck cabs was mentioned by participants, presenting challenges to having exercise equipment on hand and being able to access that equipment, particularly bicycles. Another barrier was the undesirability to exercise in truck cabs themselves. One driver described how, "I don't know how much I would want to exercise in my truck. Because of running, it already smells like a gym with dirty clothes. I work all day, and I sleep all night in here, and I really don't know if I want to work out in here also."

Company-Operated Terminals

The subtheme "*company-operated terminals*" consists of 5 meanings. Participants described barriers to engaging in healthy behaviors at company-operated company-operated terminals. These barriers related primarily to engaging in physical activity. Barriers to exercise at company-operated terminals that participants highlighted were the poor quality of terminal gyms and the tendency of gyms to be removed if they go unused. It was also mentioned how companies tend to favor fitness facility installation at locations where the corporate people work, neglecting the needs of the drivers.

Warehouses

The subtheme "*warehouses*" consists of 15 meanings. Participants highlighted barriers to engaging in healthy behaviors in warehouse settings. Overall, warehouses were seen as having "no benefit[s] health-wise for a driver." Visibility of vending machines containing unhealthy food options were cited as a barrier for healthy eating. Challenges to engaging in physical activity were identified as unfriendliness and inflexibility of warehouse employees, both among shipping and receiving staff and security staff. These challenges can restrict exercise, as one participant explained:

> "I have heard multiple accounts of this. 'Here I am, I am with Joe Schmo trucking company.' 'OK, go back to your truck and wait.' 'Well, can you give me an idea when it will be done?' 'What, are you talking back to me about this? I told you to go back to your truck and wait.' 'Well, I just would like to know how long it is going to be before it is done so I can go, and I would like to consider going for a run.' 'Hey, you've got to go back to your truck and wait!'"

Warehouses can also create barriers to exercise when they excessively delay drivers and disrupt their schedules and routines. Other challenges that were mentioned include lack of parking and the difficulty in sharing information on opportunities for exercise through social networking because of how many different warehouses drivers have to visit.

Rest Areas

The subtheme "*rest areas*" consists of 16 meanings. Participants discussed barriers to engaging in healthy behaviors at highway rest areas. Similar to warehouses, rest areas were described as not "offering any incentive as far as healthy lifestyle concerns." Rest areas were considered by some to be unsafe, and lack of available parking limited their accessibility.

Barriers to healthy eating at rest areas were identified as being due to a lack of healthy food options in vending machines, and the high expense of such options when they exist. In terms of exercise, rest areas were perceived to present several barriers, including limited size and dullness of paths and trails, as well as being configured poorly overall. Drivers mentioned how lack of cost-effectiveness of improving rest area exercise opportunities was a barrier, compounded by numerous funding cuts by states to their rest areas.

Other Barriers to Eating Healthy

The subtheme "*other barriers to eating healthy*" consists of 46 meanings. Participants talked about various other key barriers to eating healthy. Participants generally believed that eating healthy was difficult, and it was described as a "constant struggle." Lack of access and availability of healthy food options were mentioned, including difficulty accessing healthy

restaurants and grocery stores to keep healthy food stocked up in truck cabs. Other challenges for healthy eating were the poor quality and expense of healthy food options. The temptation of unhealthy food options was also mentioned by participants, due to advertisements for fast food, as well as the convenience, quickness, excessive portions, and appealing taste of unhealthy food. One participant described how other drivers "eat unhealthy because it's the easiest thing to do…those are the simple choices, and those are the cheaper choices." Another driver described the power of temptation of unhealthy food options:

> "It would certainly be easy just to knock off at the end of the day, and I think that's probably where most drivers just get out of shape. They are done with the day, they go eat an unhealthy meal that sure tastes good, looks good, smells good, but it's not good for you…and the just go veg out in the truck or hotel."

Other Barriers to Exercising

The subtheme "*other barriers to exercising*" consists of 30 meanings. Participants identified various other key barriers to engaging in exercise. Perceived barriers to exercise on the road include stigmatization – "it's stigmatized that, that's not what a trucker does" – as well as difficulty overcoming inertia and getting started for beginners. Exercise was believed to require high prioritization and sacrifice, as well as creativity in finding opportunities for exercise.

Drivers cited difficulty in finding places to exercise, including the effort required to find places, limited truck accessibility, lack of knowledge of nearby places, poor visibility of trails, the expense of searching for places ("driving around looking for stuff is expensive in a truck," noted one driver), company restrictions on the use of out-of-route miles to reach places, undesirability of exercising on a roadway, and lack of access to showers. The unpredictability of the job and the inability to plan ahead were also mentioned as barriers to exercise. One driver explained how, "If I try to anticipate something better…we don't run today because tomorrow will be a great day to get in some extra miles or something…if I try to do something like that,

half the time it gets spoiled." Inability to maintain exercise routines "makes it that much harder to try to get some exercise the next day." Other challenges to getting exercise are lack of social support, such as from wives, family life in general, and from others who are inactive. Weather was also cited as a challenge to exercise.

Time Management

The subtheme "*time management*" consists of 42 meanings. Participants discussed difficulties in engaging in healthy behaviors due to time management. Lack of control over one's schedule and the predictability of one's schedule were cited as barriers to engaging in healthy behaviors. Irregular and inconsistent eating patterns were believed to lead to overeating. These elements were also believed to be barriers to exercise. As described by one participant:

> "When we do sit [without a load], we can get out and walk around. But it's sporadic. We might sit this weekend and have three days of exercise, and then we might not sit for another week or week and a half. That's why exercise cannot be steady, and you can't get into a good habit every day of doing a routine, because your routine doesn't stay the same."

In general, participants believed that lack of time was a barrier to both healthy eating and exercise. Drivers believed that "you are tired and exhausted after a long day of driving at work," and "your job is hard enough as it is." The rigid scheduling demands of the trucking industry were believed to present barriers to engaging in healthy behaviors as well. One driver explained how, "There's a lot of pressure in this industry to get there on time," and another described how, "We're getting paid by the mile out here, so we pretty much have to get with the program and run pretty hard most of the time."

Federal regulations were additional time barriers described by participants. Drivers believed that hours-of-service rules were obsolete, and that, "It's the old 'one-size-fits-all' that doesn't fit my schedule." These rules were described as being disruptive to time management

because they "can mess with you a little bit because they've got this arbitrary number they want you to do, and they don't take into account how you sleep, so you're really fighting the rules, and that's just to even get your job done." Drivers insisted that hours-of-service can be barriers to engaging in healthy barriers, particularly exercise, because they limit time management flexibility. This opinion was expressed in regard to the 14-hour rule, which dictates how long a driver can be on-duty before taking a break; the 10-hour rule, which states that drivers must take a break of 10 hours; and the 30-minute rule, which stipulates that drivers must take a 30-minute break within the first eight hours of driving. The perception of limited flexibility because of the hours-of-service rules was expressed in the following way:

> "[Hours-of-service] adds on to the complication, especially now with the 30-minute break you have to take every 8 hours. While it sounds great, it is a limiting factor too, because you have to take it within that range of time of your driving. So you might end up where the best place of getting your exercise is where you stop for the day. 'Wait a minute, I just had to spend 30 minutes in the middle of freaking nowhere sitting on my butt in the truck or walking around somewhere.' So now it is the end of the day, and I don't have the time to spare [for exercise]. Mandating how you spend your day doesn't, to me, help with allow the flexibility you need to exercise when it works out best."

Company/Job Characteristics

The subtheme "*company/job characteristics*" consists of 47 meanings. Participants described barriers to engaging in healthy behaviors that were related to the characteristics of their individual job characteristics and of the characteristics of their company. Drivers perceived the trucking industry as being limited in terms of health-supportive resources, in part because of the limited truck accessibility. Company policies, including failure to offer health and wellness programs, as well as banning out-of-route miles to access health resources and prohibiting pets, were also described as barriers. Participants described barriers as being attributable to lack of driver loading and unloading, inconsistent or unpredictable routes, and additional time challenges due to specific types of routes or having to be a team driver. The boredom of the job

was also explained to be a contributing factor to unhealthy eating: "There's a lot of drivers that have an issue with eating snacks out of boredom when they're behind the wheel," stated one participant. Finally, fatigue and stress due to the characteristics of one's job were identified as barriers to healthy behaviors – this was explained as being due to having to "work longer hours than normal people, having "interrupted sleep patterns," and, at the end of a long day of work, drivers "want to just relax, put your feet up."

Individual Characteristics

The subtheme "*individual characteristics*" consists of 25 meanings. Participants highlighted individual characteristics of truck drivers in general that serve as barriers to engaging in healthy behaviors. Lack of motivation was identified as an individual characteristic that serves as a barrier to engaging in healthy behaviors. One driver explained how, "The hardest thing, in my opinion, is getting motivated to exercise." Another driver described how, "A lot of drivers don't motivate themselves. A lot of them are just perfectly content to just lay around the bunk and watch TV wherever they're parked."

Another individual characteristic that was referenced as a barrier to healthy behaviors was self-consciousness. "You've got to run across a parking lot full of a bunch of abrasive people waiting to make fun of somebody…you know how truck drivers can be," explained one participant. This was described as being particularly daunting for overweight drivers, as "when you're a big fat truck driver that's a huge issue." This was also described as a specific issue for women drivers.

Other barriers to healthy behaviors that were mentioned include not having the proper attitude, lack of knowledge about how to behave healthily, and lack of social networks. The challenge of breaking the "vicious cycle" of unhealthy behavior was also described:

> "The more unhealthy you are…it has the tendency to change your state of mind. It gives you more of a negative [outlook]. It's a vicious cycle…you're miserable, so you eat, and you get in the truck, and you don't feel like getting out, so you eat some more."

Trucking Culture

The subtheme "*trucking culture*" consists of 18 meanings. Participants discussed the role of the overall trucking culture as a barrier in engaging in healthy behaviors. One participant described the overall effect of the trucking culture:

> "It really is a lifestyle. It is not just, 'I am just driving this truck.' I am away from my home, I am away from my resources. I am limited in what I can carry with me by the size of the truck. No matter how much you enjoy it and turn all those things to your advantage. No matter how much of a fit you are for that type of lifestyle."

Another participant stated that, "Nobody's worried about the driver. It's like the driver comes last."

Among the barriers to healthy behaviors perceived by participants were safety concerns endemic to the trucking profession, including other drivers and across settings. It was stated that "everywhere's unsafe." Job and financial pressures, and the priority that job duties have over health behaviors, were also cited. Participants also described the people the industry typically attracts as a barrier to healthy behaviors as a whole. Such people were described as "mavericks," and that the overall lack of structure of the profession was a barrier. Another driver also mentioned how the industry attracts low income people, and that there was a correlation between health behaviors and income. Finally, another driver explained the barriers that such people in the industry can present in trying to engage in healthy behaviors:

> "Seeing other drivers out there eating unhealthy…two of my team drivers that I talk to, they always want to see me and tell me what kind of meal they've had for the day. And, of course, they start talking hamburgers and barbecue and things like that. You think, 'Gosh, why am I doing this again? Why am I eating this chicken sandwich again?'"

Theme 3: Recommended Alternative Settings

The third theme is labeled "*recommended alternative settings*" and is composed of 200 meanings, grouped into 7 subthemes. Meanings included in this theme reflected changes that drivers support across various settings as they seek to engage in health-supportive behaviors. The settings which drivers suggested changes for were truck stops, truck cabs, company-operated terminals, warehouses, rest areas, trucking companies; also, there were suggestions as to how drivers as a group should catalyze change in these settings.

Truck Stops

The subtheme "*truck stops*" consists of 73 meanings. Participants suggested ways that truck stops could be modified to better support healthy behaviors. Participants described truck stops as being a "major factor" for health, and they are "basically your home away from home" and "the most important resource for a driver."

Participants suggested that truck stops offer more healthy food options. These options should be promoted and visible, and nutrition information should be offered, particularly at restaurants. These options should be of high quality, fresh, and affordable. Emphasis was placed on having more healthy food options in the convenience store area and in restaurants. Improved grocery options were also emphasized, including providing a local farmers' market on-site. It was recommended that truck stop restaurants expand their healthy options on their menus, advertising and labeling their healthy menu items, and that they should reduce portion sizes. Options for drivers to prepare their own healthy food, such as outdoor grills, were also suggested. Participants also believed that unhealthy food options should no longer be pushed by truck stops, and that fast food and buffets should be removed.

Participants also proposed ways to enhance exercise opportunities at truck stops, such as by promoting facilities and incorporating fitness facilities into the master plans for truck stops. Drivers suggested that truck stops provide gyms that are enjoyable, high quality, larger, affordable, visible, and provide a more extensive set of equipment. Enhancements to outdoor exercise opportunities were recommended as well, including improving sanitation of parking lots, improving the overall walkability of truck stops and providing walking paths and connections to nearby trails. Particular emphasis was given to information provision, as drivers desired truck stops to provide information on nearby opportunities for exercise, such as trails, paths, sidewalks, and gyms. To quote one driver:

> "They can have maps with walking trails. It would take extremely minimal effort. They could put together a map and hang it on the wall. I would look at it. That could be something that they could do that wouldn't cost much money. It would cost much money for them put that on the wall and maybe it would inspire a culture."

Truck Cabs

The subtheme "*truck cabs*" consists of 23 meanings. Participants recommended ways that truck cabs should be modified to better support healthy behaviors. Truck cabs were described as being important to driver health, "without a doubt." Participants believed that truck cabs should be customized more efficiently, such as removing the passenger seat to create more space for healthy options.

To better support healthy eating, several improvements were suggested for truck cabs, such as providing accessories. Among the accessories identified were refrigerators, freezers, power inverters, microwaves, and crock pots. To support exercise, participants recommended that truck cabs have in-truck exercise equipment installed, such as the FIT system, which is a system of resistance bands. Participants also recommended more storage space available inside

truck cabs, which would facilitate bringing fitness equipment such as bicycles, kettle bells, weights, and exercise bands in the truck cab.

Company-Operated Terminals

The subtheme "*company-operated terminals*" consists of 20 meanings. Participants proposed ways that company-owned company-operated terminals could be changed to better support healthy behaviors. Company-operated terminals were described as particularly important for the health of company drivers. Improvements to support healthy eating that were suggested were providing healthy snacks, providing healthy food during employee appreciation events, providing menus for local restaurants that deliver healthy food, and providing transportation, such as a company car, so drivers can access nearby healthy food options. Participants recommended that company-operated terminals provide gyms to drivers to enhance exercise opportunities. They also suggested that company-operated terminals provide showers to further encourage drivers to engage in physical activity.

Warehouses

The subtheme "*warehouses*" consists of 21 meanings. Participants identified ways that warehouses could be altered to better support healthy behaviors. Warehouses were not generally perceived to be particularly significant to health for drivers, nor did drivers consider warehouses to be responsible for supporting driver health.

Participants believed that warehouses should decrease detention time of drivers by completing loading and unloading faster. To better support healthy eating, it was recommended that warehouses provide healthier options in vending machines, as well as places for drivers to prepare food, such as microwaves in drivers' lounges or outdoor grill areas. To support exercise, participants recommended that warehouses provide exercise areas, showers, information on

nearby places to exercise, more flexibility in allowing drivers to exercise while being loaded or unloaded, and more accurate time estimates for loading and unloading. As one driver suggests:

> "One of the things I would like to see is knowing how long it will be to get loaded or unloaded. If it's going to be half an hour I can't do anything. I'll sit there and read a magazine for half an hour. But if it's going to be two hours, I can go out and take a walk. A long walk, or a jog."

Rest Areas

The subtheme "*rest areas*" consists of 16 meanings. Participants discussed ways that highway rest areas could be improved to better support healthy behaviors. Drivers generally believed that rest areas were mostly important for convenience and rest than they were for their health resources. Suggestions for improving rest areas include providing healthier snacks in vending machines, providing places to prepare food, and providing and enhancing trails and walking paths.

Trucking Companies

The subtheme "*other barriers to eating healthy*" consists of 43 meanings. Participants suggested ways that trucking companies could better support healthy behaviors. Participants expressed that companies should play a bigger role in driver health, including by promoting health and providing support for health-supportive behaviors. This was believed to be mutually beneficial for both driver and company; as one driver explained, "if a trucking company would take interest in drivers' health, it would reduce their turnover rate and make them more profitable." Another driver expressed, "It would be a win-win for the company and driver for the company to promote exercise and healthy living on the road." It was also believed that companies could accomplish this without spending a lot of money.

Participants expressed their beliefs in the importance of company health and wellness programs, and how they can help generate lifestyle change for drivers. A number of important

elements that these programs should include were suggested, including: Being part of the company culture; promoted, advocated, and encouraged through dispatchers; offering scheduling to accommodate healthy behaviors; provision of education about health issues and healthy behaviors; incentivized; provide a way to track progress; offer modifications to truck cabs; and provide medical professionals. Other suggestions for ways that companies can support driver health were identified as providing accessories in truck cabs, allow for out-of-route miles for drivers who want to access health resources, providing scheduling that allows time for exercise, providing free or discounted gym memberships, and sponsoring fitness groups.

Truck Drivers

The subtheme "*other barriers to exercising*" consists of 4 meanings. Participants talked about what truck drivers as a whole could do to elicit health-supportive changes in their settings. Possibilities that were suggested were coalition-building and forming driver communities in support of health. These participants also pointed to the need for drivers to do a better job of advocacy for health issues:

> "We're not politically savvy. We could do a way better job of approaching people. Even the way we approach government officials about stuff, to be organized when you bring up your thought. A positive change, not just being against things. I think that this industry tends to get too macho, bump our chests at whatever we do as stupid men."

Theme 4: Constituents of Health Behavior

The fourth theme is labeled "*constituents of health behavior*" and is composed of 107 meanings, grouped into 7 subthemes. Meanings included in this theme consist of important elements and factors in engaging in health-supportive behaviors. These meanings were not necessarily tied to specific settings; rather, they were general beliefs regarding important elements in factors in engaging in these behaviors. The important constituents of health behavior

were related to healthy food, exercise, overall health, social support, stress avoidance, motivation, and time/fatigue management.

Healthy Food

The subtheme "*healthy food*" consists of 32 meanings. Participants discussed important features of consuming healthy food. In general, participants indicated that they prefer having a variety of healthy food options, and they prefer to purchase locally produced healthy food options. Drivers acknowledged the importance of the connection of emotion and eating behaviors, stating that, "No matter how good your willpower is, food and emotion go together…you cannot separate that." One participant discussed how:

> "I had to recognize what made me want to grab a doughnut, so I had to recognize the stress and the triggers. 'Well, I'm mad because my load got cancelled.' So I used to grab a doughnut and start eating. But now if I grab an apple or something crunchy, I can fight that feeling. Or if I get out and go for a walk or something."

Drivers identified other important aspects of engaging in healthy eating behaviors, including: making the time to eat healthy, carefully choosing what to buy, having healthy food always available, controlling portion sizes, controlling snacking behaviors, having nutrition information readily available, and being educated about nutrition information. Several participants also mentioned how they would allow themselves to consume unhealthy foods in moderation; one driver talked about how "you can have an indulgence once in a while, but you got to do it with moderation…the rest of the time you're focused on eating right." Other important aspects related to healthy eating that were brought up where proper hydration, taking supplements, and taking vitamins.

Exercise

The subtheme "*exercise*" consists of 32 meanings. Participants identified relevant factors to being able to engage in physical activity. Several participants indicated their preference for

exercising outdoors instead of in gyms or in their truck cabs. Being able to exercise during 10-hour breaks and during optimal weather were also preferred. Overall, making exercise a priority was frequently mentioned as being important, with drivers describing how "I have to fit in some exercise somewhere," "You've got to get out there and do it," and "You have to make time." Finding types of exercise that are enjoyable, as well as finding places to exercise that are interesting, were described as being important because they help to avoid dreading exercise. In the words of one driver, "I've found something that I like doing, so it takes the burden out of the task…it's not something that I dread doing like so many people." Other important elements to engaging in physical activity that were mentioned were having social supports, adequate equipment, and access to showers.

Overall Health

The subtheme "*overall health*" consists of 10 meanings. Participants talked about key factors in engaging in health-supportive behaviors in general. Making health and living a healthy lifestyle were identified as being important to participants, as was having a long-term perspective on health. Making small changes was considered to be an important element of overall health. As one driver put it:

> "I still use the same advice for myself when I get into the situation: Any single little thing you do, literally every little step you can take, is an improvement over doing nothing. All those little steps, no matter how small, you got to do it first. If you don't do it, you won't get anywhere."

Social Support

The subtheme "*social support*" consists of 16 meanings. Participants discussed the importance of social support in engaging in healthy behaviors. Overall, social support and social networks were considered important to drivers as they engage in healthy behaviors. In particular, positive social support was considered to be helpful in enhancing willpower and

avoiding negativity. Social support also was described by a participant as providing access to technological resources, stating that, "I'm the old, technologically inept guy. I've learned from the younger drivers about how to do things. It's like, 'Wow, that's a cool idea.'" Sources of social support that were mentioned were from family, Facebook groups, and trucking companies.

Stress

The subtheme "*stress*" consists of 7 meanings. Participants described the role of stress in engaging in healthy behaviors. Drivers described how stress reduction is an important consideration and how stress can lead to health complications and engaging in unhealthy behaviors, such as eating unhealthy foods. Among the health complications that were cited were high blood pressure and heart attacks. Stress management was described as contributing to overall health as well. Proper time management and not getting stressed out while working were mentioned as important aspects of stress reduction.

Motivation

The subtheme "*motivation*" consists of 6 meanings. Participants highlighted the importance of motivation in engaging in healthy behaviors. Motivation was believed to be an important factor in engaging in these behaviors in general. This was mentioned as being particularly relevant for exercise, with one driver describing about himself the importance of "finding something that I can stay motivated to do" and how that was "something that I struggle with all the time."

Time/Fatigue Management

The subtheme "*time/fatigue management*" consists of 4 meanings. Participants described the role of managing time and fatigue in being able to engage in healthy behaviors. Fatigue was mentioned as an important safety factor, and drivers talked about the importance of not driving

fatigued. Time management was indicated to be critical in reducing fatigue, as was avoiding work schedules that generate excessive fatigue – one driver stated, "I will not kill myself to get a load anywhere ever again."

Theme 5: Motivation for Health Behaviors

The fourth theme is labeled "*motivation for health behaviors*" and is composed of 158 meanings, grouped into 9 subthemes. Meanings included in this theme consist of sources of motivation for drivers as they sustain health-supportive behaviors. The important sources of motivation for health behavior were social networks, enjoyment of healthy behaviors, perspective on health, benefits of healthy behaviors, internal motivation, pursuit of goals, cues for health behaviors, stress relief, and regulatory pressures.

Social Networks

The subtheme "*social networks*" consists of 36 meanings. Participants discussed the role of social networks in providing motivation to engage in healthy behaviors. Social networks were considered to be critical to motivation for a number of participants. Some of the social networks that were mentioned include bicycle riding groups, racing groups, and groups of other drivers. These social networks were perceived as providing accountability, positive reinforcement, and information. Interest and support from other drivers were mentioned as important for motivation, as were seeing unhealthy drivers – one driver described how, "Sometimes, my wife wants to go to Wendy's and get a frosty. The person in front of her looks really bad, so my wife will turn around and leave." Some participants mentioned receiving motivation from the desire to be a motivator and inspiration to help unhealthy drivers to change their lifestyles.

Participants also identified their families as providing motivation to engage in healthy behaviors. This motivation was mentioned as coming from one's immediate family, such as wife, children, and life partner, as well as from grandparents. In the words of one driver:

> "My grandfather, who's full-blooded Western Cherokee Indian from Oklahoma…he was a major motivator in my life. Just from what I learned from him when I was young and everything, because he had a real strong work ethic about him. That's part of why he left the reservation. He knew he could work and earn a better life for himself, and that's what he went after. He gave up his Native American rights from living on the reservation, he gave up all that because he wanted a better life. A lot of that probably motivated me in terms of my health, too, in order to do better."

Finally, companies were parts of drivers' social networks that provided motivation. Companies were described as providing motivation through health and wellness programs. Drivers' dispatchers were also mentioned as being motivating, with one participant describing the powerful impact her dispatcher had on her life:

> "To be honest with you, before [my former partner] passed away I wasn't sure if I even liked [my dispatcher]. What happened is, when she was sick with cancer for 14 months, they let me work locally. [My dispatcher] was there for me when [my former partner] passed away. I think he saw that I needed comfort in my life to keep me motivated. He made a tremendous impact in my life."

Enjoyment of Healthy Behaviors

The subtheme "*enjoyment of healthy behaviors*" consists of 29 meanings. Participants described how the enjoyment of engaging in healthy behaviors provided motivation. Expressions of enjoyment centered on exercise; among the descriptions reflecting enjoyment of exercise include, "I'm so happy when I know that I am going into a place and I'm going to have time to get my bike out," "The days I that I don't run are bad days," and "Once you get started you get hooked." Participants saw exercise as providing enjoyment partly because they were able to access restaurants, and entertainment. Exercise was also described as providing a way to

explore new places and go sightseeing. The unique opportunity to explore new places by exercising as a truck driver was described in the following way:

> "I had a woman at my church that is a terrific runner. And she's really structured, and her workouts are really structured. And then one day we were talking about it at church, and she goes, 'You know what? You're lucky.' I said, 'Wait a minute, now I'm confused.' And what she says is, 'You get to run at a different place every day.' I thought, 'Wow, I've never looked at it that way, but you're right.'"

Exercise was also enjoyable because it was perceived as providing freedom and a connection with driver's personal pasts. A specific exercise experience of a participant highlighted this:

> "When I first got my bike, I didn't even know if I was going to be able to ride it. The last time I had rode a bike I was 10 years old. I got my bike three years ago – I was 50. You get on that bike and after you get over that initial fear, and you start going, you do feel like you're 10 again. Nothing else matters. Everything else is left behind. It's just you enjoying yourself. Nobody is out there making you go fast. You go at your own pace. You have that feeling of freedom that you felt when you were 10 when you didn't have the weight of the world on your shoulders. You didn't have to worry about what bills have to be paid, 'is my spouse back home and alright?' All of that leaves you. When I first started riding my bike I was so scared that I wasn't going to be able to do it. When I first got up on my bike I actually started crying. That's how good it felt. I was in tears. That feeling hasn't left. Every time I get my bike out I feel that freedom."

Perspective on Health

The subtheme "*perspective on health*" consists of 24 meanings. Participants highlighted the role of perspective in providing motivation to engage in healthy behaviors. For several participants, this perspective centered on recalling previous health status. The influence of the past was described by one driver as, "You hit rock bottom, or you learn that you don't want to hit rock bottom." Drivers described how they would be "short on breath doing routine things," "really getting unhealthy," and getting to the point where they "couldn't even walk." Drivers would even carry visual cues, such as pictures of themselves when they were in poor health. Several participants mentioned a health scare in the past providing this motivation. One participant stated that, "Most drivers need a 'come to Jesus' moment, which is usually a health

issue." Other sources of perspective that were identified as providing motivation were a history of family health issues, as well as having a long-term perspective on health outcomes:

> "I look at it as being long-term, because I'm thinking about the quality of life I want to have when I'm retired. I still want to have the freedom to get out and do whatever I want, whenever I want. I don't want to be forced out of the industry by circumstance. I want to leave the industry on my own terms if I ever find something else to do, or when it comes time to retire. That's what has motivated me to think long-term about it. I still on plan on riding my bike when I'm in my 60's and after I've already retired and turned in the truck keys for the last time."

Benefits of Healthy Behaviors

The subtheme "*benefits of healthy behaviors*" consists of 15 meanings. Participants talked about gaining motivation to engage in health-supportive behaviors from the perceived benefits. Many of the benefits mentioned by participants focused on overall benefits to one's health, as well as losing weight, improving fitness, or even an overall desire to change one's lifestyle – in the words of one driver, this meant losing weight by "doing this the right way." Among the benefits that motivated drivers were seeing the results; as one driver described it, "When I look at myself in the mirror and see that I've got a six-pack emerging from what was belly fat years ago, that's a motivator right there." Drivers also perceived benefits emerging in the form of increased energy, increased metabolism, and positive feelings after exercise.

Internal Motivation

The subtheme "*internal motivation*" consists of 14 meanings. Participants discussed the importance of motivation coming from within as they engaged in healthy behaviors. Participants described how "all motivation comes from within," "it's really about what I want," and "I'm my biggest critic, as well as my biggest motivator." Another participant stated this internal motivation in the following way:

> "You've got to have a strong mind in order to make anything happen in life, I don't care what area of life it is you're talking about, because nothing's ever going to be just handed to you. You've got to work for it. You've got to make it happen on your own."

Pursuit of Goals

The subtheme "*pursuit of goals*" consists of 14 meanings. Participants identified goals that provided motivation to engage in healthy behaviors. One driver explained, "It makes it easier when I have even a small goal." These goals primarily were related to exercise. Among the goals identified by participants were increasing physical condition; participating in marathons and races; reaching hiking goals; and meeting the physical requirements for a new job. One driver also described how he had a goal to be physically fit because of the challenge of being a truck driver. He stated, "I like a challenge. If somebody tells me I can't do something, I'm going to prove them wrong."

Cues for Health Behaviors

The subtheme "*cues for health behaviors*" consists of 13 meanings. Participants described various cues, both visual and psychological, that provided motivation to engage in healthy behaviors. One source of cues was generated from building momentum through having a routine of exercise – "If you keep up your exercise it becomes a little bit addicting, and you're kind of used to it, and you don't have a problem" was how it was described by a participant. Another driver described motivation from having a streak of consecutive days of exercise, and how, "It's like I've got too much invested [to stop]." Other cues for healthy behaviors that provide motivation include tracking food intake, visibility of exercise opportunities or equipment, literature, or even having a pet in the truck.

Stress Relief

The subtheme "*stress relief*" consists of 7 meanings. Participants talked about motivation for healthy behaviors came from finding of stress relief. Living a healthy lifestyle was perceived as being important to reducing the stress that comes along with being a truck driver. A major aspect of stress relief that was identified by drivers was the use of exercise to escape from the trucking environment, which provides mental relief. One driver described the impact of exercise on stress:

> "The second my [bicycle] wheels leave the pavement of the truck stop I swear my blood pressure just plummets. It just drops down into the happy department; I got a smile on my face, because you leave all the stress of the logbook and the rules and regulations, the maintenance of the truck. You leave it all behind and it is a huge mental break. Getting the hell away from the truck stop is a major, major benefit mentally as well as physically."

Regulatory Pressures

The subtheme "*regulatory pressures*" consists of 6 meanings. Participants provided an overview of the motivation gained from pressures to improve health from federal regulations. The perception of several participants was that there is an increased emphasis on enforcement on the part of the federal government regarding several health outcomes, including sleep apnea, diabetes, blood pressure, and obesity. One participant said, "I think some of that motivation can come in the form of potentially losing their privileges to drive." Another mentioned how, "FMCSA's sleep apnea initiative scared a lot of drivers into thinking about their health."

Theme 6: Attitude toward Health Behaviors

The sixth theme is labeled "*attitude toward health behaviors*" and is composed of 56 meanings, grouped into 3 subthemes. Meanings included in this theme consist of perspectives critical aspects of attitudes that enable health-supportive behaviors. Critical aspects of attitudes

that enable health-supportive behaviors are individual responsibility, positivity, and a general healthy approach.

Individual Responsibility

The subtheme "*individual responsibility*" consists of 33 meanings. Participants described the importance of taking individual responsibility in being able to engage in healthy behaviors. Many participants believed that being healthy as a professional driver was possible, but it fell upon the individual drivers to make the personal decision to be healthy. Some drivers tended to be dismissive of the role of the profession in health outcomes, making such statements as, "It's the drivers who make it an unhealthy lifestyle," "I don't think it's any more difficult to eat right when you're out trucking…it's a personal choice," and "The drivers have to have the discipline to make the wiser choice based on what's available." One participant described the process of coming to this decision: "That [mentality is] something that's developed as I've decided to be healthy. If you asked me before I decided to try to become health, I would have told you, 'No, it's the truck's fault,' and that none of it is my fault." Another participant explained the importance of taking personal responsibility for his own health:

> "Nobody can do it for you. Because, believe me, people told me for a lot of years that I needed to do something. And I said, 'Okay, just as soon as I'm done eating.' Until I was standing in a store wondering what cane I could buy and still look like I could do my job anymore. That's a pretty drastic wake-up call, and literally that's where I was at…wondering, because I couldn't walk anymore. So it was like, 'This is stupid. I've got to do something different.' So I started the process."

An important aspect of individual responsibility that was brought up by participants was the inability to force behavior change on drivers. Several drivers believed that a personal choice in lifestyle change was a necessity, and that attempting to force change on drivers would be ineffective at best, and resisted at worst. One driver discussed how, "They can change the entire truck stop environment, but if somebody doesn't choose to follow that lifestyle, they'll go to

another truck stop." This sentiment was extended to hours-of-service regulations in general, with it being said that regulations remove personal responsibility from drivers.

Positivity

The subtheme "*positivity*" consists of 12 meanings. Participants talked about the role of positive attitude, and the role of evading negative attitude, in engaging in healthy behaviors. The importance of positivity was explained by one participant:

> "Many drivers that we see are victims, and they're down all the time. They don't see the good. They're always looking at the bad. So I think that's one of the hardest things out here is getting to feel good about what they're doing and themselves."

Included in the importance of remaining positive was the ability to avoid negativity. Participants mentioned avoiding interactions with negative drivers, including by not spending time on the CB radio, at company-operated terminals, or at truck stops. The effect of spending time around negativity, according to one participant, was that, "You're only going to feel worse afterward. You hear the guys. You'd think the world was coming to an end tomorrow if you sat and listened to that BS."

General Healthy Approach

The subtheme "*general healthy approach*" consists of 11 meanings. Participants described the important attitudinal aspects of an overall healthy lifestyle. Mentioned by participants were having an attitude oriented towards valuing and seeking healthy behaviors in general. In the words of one driver, "If you want to make it not work, you can do that. But if you want to make it work you can. It's just your attitude." Multiple participants mentioned their ability to lead by example as impacting their attitude, and how drivers can have a unique impact on other drivers in encouraging healthy behaviors; this is because, according to one driver, "It's basically up to the drivers to see others like myself who are actually leading by example…those

are the people they can learn from, because somebody that's sitting in his office is not going to have that type of connection with what it's like to exercise on the road like another driver would." Being healthy was also mentioned as contributing to the overall professionalism of professional drivers.

Theme 7: Trucking Culture

The seventh theme is labeled "*trucking culture*" and is composed of 99 meanings, grouped into 5 subthemes. Meanings included in this theme consist of perspectives on the personal health impacts employment as a truck driver has had, and the broader culture of the trucking industry. The important aspects of the culture of the trucking industry for health behaviors are related to individual impacts of employment as a truck driver, the broader culture, general driver characteristics, transition to a healthier culture, and the health culture in the past.

Individual Impacts of Employment as a Truck Driver

The subtheme "*individual impacts of employment as a truck driver*" consists of 36 meanings. Participants described the perceived impacts their choice to become a truck driver had to their health. Descriptions of the impact of occupational choice on drivers' health varied. Some drivers believed that trucking has impacted their health. Others believed that it has not:

> "I was way unhealthy as a truck driver, and over the last five years I've made a drastic change. But I'm still driving for the same company. I've been with the same company for 25 years. So for 20 years I was extremely unhealthy, and for 5 I have made basically a 180 degree turnaround doing the same job."

In terms of the valence of the impact of trucking on health, some drivers believed that their health has been negatively impacted by being a truck driver:

> "I would probably be more healthy [in a different career]. If I was working a regular job in an office and I wasn't driving a truck I would probably find more time to ride my bike and go to the gym on a regular basis."

Other drivers described the trucking profession as having a positive impact on their health, with one driver stating that, "If your goal is to be healthy, then my career is actually not a bad job." Another driver expressed, "I would never have realized how many wonderful places there are with things to see and do out here."

Occupational health hazards beyond those related to nutrition and physical activity were also described by drivers. Among these are lung cancer, skin yeast infections, nerve damage, kidney problems, bladder problems, kidney infections, bladder infections, spinal stenosis, knee and hip problems, digestive problems, heart problems, sensory deficits, dehydration, and temperature stress.

Broader Culture

The subtheme "*broader culture*" consists of 10 meanings. Participants identified key elements of the overall trucking culture and how they impact driver health. The overall culture was described as being a challenge to health by drivers, with one driver mentioning how, "It's so easy to go in the other direction, become unhealthy." The primary difficulty with the broader culture of the trucking industry that was highlighted by participants was the sedentary nature of truck driving. The previous lifestyle that one driver had was described in the following way:

> "At first I'd say [truck driving] was an adverse effect [on my health]. I just fell into the sedentary lifestyle. I guess the traditional lifestyle of a truck driver. Just driving, eating always potato chips or whatever and steadily gaining weight."

Another driver explained how, "With driving, you're stuck in that seat. You'd drive for four hours at a time, and you'd never get out of that chair."

General Driver Characteristics

The subtheme "*general driver characteristics*" consists of 14 meanings. Participants pointed to general individual characteristics of the truck drivers that are relevant to engaging in

health-supportive behaviors. In general, drivers in this study described truck drivers as a whole as being in poor health, with one participant describing how, "I don't think it's okay to look at somebody and wonder how they're going to get back into the truck…it's really depressing and sad…it's a wake-up call." Another driver put it bluntly by saying, "The thing is with truck drivers, we're out here saving social security. We're not living into retirement." Participants contrasted driver health with health in other occupations; "That's not what I'd expect to see in a professional setting," described one driver. Truck drivers as a whole were described as being sedentary, loners, and not wanting to put in hard work to lose weight. One participant stated that, as far as exercise, "It's stigmatized that, that's not what a trucker does."

Transition to a Healthier Culture

The subtheme "*transition to a healthier culture*" consists of 31 meanings. Participants described the current trends in the trucking industry that are related to driver health. The general consensus from participants was that the industry was moving towards being more supportive and more strongly emphasizing driver health. Part of this trend was reflected at the federal level, with drivers describing the role of hours-of-service rules in providing drivers with time to engage in healthy behaviors. Another driver described how, "For the first time ever, I saw the term appear, 'for the benefit of the drivers' long-term health.' Which is, to me, a small miracle."

Participants also described an increase in awareness among drivers about health. Participants described how other drivers "realize now that what they're doing isn't working," and that this trend "has a chance to snowball." Another driver emphasized how this trend is important for truck stops, stating his belief that "they need to realize that there is an issue of critical mass that is going to happen eventually."

Many participants believed that, overall, settings have improved as far as health resources. This includes access to healthy food in general, as well as access to healthy food and opportunities for exercise at truck stops. Drivers also mentioned the importance of building momentum of usage of fitness facilities, and how many of these facilities appear to be used more frequently than in the past. Truck cabs were also mentioned as being more supportive of health, as have warehouses due to reduced detention times. Still, one participant stated how it continues to be important to "get the word out or get drivers to want to do better…to want to live a better lifestyle."

Health Culture in the Past

The subtheme "*health culture in the past*" consists of 8 meanings. Participants reflected on the previous state of the trucking industry as it related to driver health. Some participants described how, compared to the past, drivers are unhealthier and more sedentary. This was expressed as being due, in part, to regulatory changes:

> "Back in the day, before regulation, a lot of drivers did their own work. They were loading and unloading their own equipment. Now it's more of a sedentary job. You're basically sitting in your truck waiting for someone to unload you."

Another explanation for poorer health among drivers than in the past pertained to changes in truck cabs:

> "Now we're seeing in the last 20 years…since conventional truck started coming and they have seats that adjust 40 different ways from Sunday and telescoping and tilt steering wheels. So with the change in equipment, this has allowed people that are morbidly obese to be able to come out and, in a very short time, make a living for themselves."

Some participants also referenced efforts in the past to provide more healthy options, and how that effort failed. Past efforts, and current efforts, were summarized by a participant in the following way:

> "Like anything else, when people shift to do things in healthy ways they usually make a lot of mistakes. I think the truck stops about 10 years ago, they were pushing for healthy stuff. But for one thing, it wasn't all that healthy, and nobody really cared. Well, the timing was bad, and I think those things take time, and it's getting better."

Essential, Invariant Structure

The experience of being a healthy driver varies greatly for each individual, consisting of a complex and unique set of resources and challenges that unfold in countless and ever-changing settings. Barriers exist in nearly every setting drivers visit, including truck stops, company-operated terminals, warehouses, rest areas, and even their own truck cabs. Broader barriers which make it difficult to lead a healthy lifestyle, including those related to job and company characteristics, time management, individual personality attributes, and the overall culture of the trucking industry, all combine to lead many drivers through a vicious cycle of unhealthy decisions perpetuating more unhealthy decisions.

As a driver, being able to consistently engage in health-supportive behaviors means making use of the resources available on the road. These resources are found in multiple settings, including but not limited to truck stops, company-operated terminals, warehouses, rest areas, and truck cabs, as well as through companies or job characteristics. Being healthy on the road also often means thinking about "settings" differently – healthy drivers are able to escape the bounds of traditional truck driver settings and find ways to access resources in additional settings. Nearby neighborhoods, trails, grocery stores, restaurants, and gyms are among the settings that healthy drivers take advantage of that many other drivers may not be cognizant of or have not taken the steps to use them. Healthy drivers have unique insight into meaningful ways that settings can be changed to better support healthy behaviors by providing resources and removing barriers.

Because of the unique barriers and limitations on resources endemic to the trucking profession, adaptation and flexibility are essential elements in living healthy on the road. Healthy drivers tend to have a number of personal characteristics which enable them to thrive while others struggle. Taking control of one's own health through having a profound sense of personal responsibility, maintaining a positive attitude towards health behaviors, prioritizing health, and being able to improvise ways to access and use resources all help to enable health behaviors. Multiple, inspirational sources of motivation, often working simultaneously and from several sources, are critical in perpetuating healthy behaviors as well, as being a healthy driver is a constant struggle for most.

Within the broader culture of the trucking industry, where being sedentary is the norm and physical activity and healthy eating are still stigmatized, taking full advantage of all possible resources, both external and internal, helps drivers to maintain their health. Healthy drivers take pride in their ability to motivate others, overcome challenges, be innovators, and be trendsetters within an overall optimism that the culture of the trucking industry is shifting towards supporting and prioritizing the health and well-being of its drivers.

CHAPTER 5

DISCUSSION

The primary goal of this current research was to explore the experience of being a healthy driver in the extreme obesogenic settings endemic to this occupation. By engaging drivers who have been able to sustain health-supportive behaviors over long periods of time, a great deal of information was obtained that provided insight into the lived experience of these drivers. The rich descriptions provided by these drivers enabled the development of seven broad themes that provided a vivid illustration of this lived experience. The "purposeful maximum sampling" technique used in this study meant that a number of diverse viewpoints were included in the description of the lived experience and the seven themes that were developed.

The two purposes of this study were to discover the ways in which drivers were able to exhibit resiliency when confronted with these barriers and remain healthy while existing in endemically obesogenic environments and to understand the setting-level barriers to engaging in health-supportive barriers for truck drivers in their worksites. To address these two purposes, as well as the overall goal of the study, in-depth interviews were conducted with drivers who have been successful in engaging in health-supportive behaviors over long periods of time. The current study was driven by ecological theories of health behavior. This theoretical background included both general ecological theories and ecological theories of health behavior that were developed specifically for the population in question.

Results in Relation to Ecological Theories of Health Behavior

Ecological theories of health behavior can be advantageously used to guide health promotion efforts; however, choosing an appropriate theory for the population in question is vital. Numerous ecological theories of health behavior have been described in scientific

literature. Many of these are covered in the introduction section of this document. However, in the context of the findings of this study, two ecological theories of health behavior seem particularly relevant: the Model of Community Food Environments, and the Ecological Conceptual Framework of Trucking Obesity. The results of this current study support these two ecological theories of health behavior in numerous ways to help explain the factors in truck drivers' engagement in health-supportive behaviors.

Model of Community Food Environments

The Model of Community Food Environments (Figure 2.9) seeks to explain the factors that make up food environments. This model consists of six primary components: Policy variables, the community nutrition environment, the organizational nutrition environment, the consumer nutrition environment, the information environment, and individual variables (Glanz, Sallis, Saelens, & Frank, 2005). This framework appears, given the findings of the current study, to be an appropriate way to conceptualize the food environments in which truck drivers live while they are on the road. Many of the policies, environments, and individual factors are also applicable to physical activity as well.

Policy Variables

Policy variables consist of government and industry policies which influence the community nutrition environment, organizational nutrition environment, consumer nutrition environment, and information environment (Glanz et al., 2005). Policy variables align with the themes that emerged from the results of the interviews in the current study.

Participants discussed the negative impact of company policies on being able to eat healthy. These policies disallow certain accessories, such as power inverters or cooking accessories, in truck cabs. Also related to company policies is the barrier of lack of control over

schedules for drivers. Schedules are controlled largely through company policies and procedures, and participants noted how their schedules were irregular and inconsistent and led to overeating. Lack of time overall was a barrier to healthy eating related to policy variables, which is related to the role of company policies of not allowing drivers to use out-of-route miles to access health resources, thereby restricting accessible nutrition environments. The potentially positive impact of company policies on drivers' nutrition environments were further expressed, as drivers supported company health and wellness programs. Such programs were described as providing motivation for health behaviors, including those related to food consumption.

Policy variables at the governmental level were also referenced as impacting the nutrition environments of drivers within the themes of this study. As far as the hours-of-service regulations, not only do company policies impact the overall nutrition environment as far as time management, but drivers believed that these regulations do so as well. However, some drivers believed that, overall, government policies were shifting toward being more supportive of driver health, and that hours-of-service changes impacted drivers' community nutrition environments in a positive way.

Community Nutrition Environment

The community nutrition environment consists of the distribution of food sources and includes such relevant factors as the number, type, location, and accessibility of these food sources (Glanz et al., 2005). The concept of community nutrition environment is reflected in several of the themes that were derived from the interviews in this study.

The community nutrition environment was expressed across multiple themes. At truck stops, convenience stores, sit-down restaurants, fast food restaurants, and buffets are the accessible sources of food. Truck cabs offer a way for drivers to "stock up" on foods. Drivers

discussed how they were able to stock up on food at home during their time off and take it in their trucks with them or visit grocery stores, farmers' markets, and local meat markets by either finding locations that are truck-accessible or by borrowing a company car at a terminal. Truck cabs also provided the opportunity to prepare food options in their trucks by using a variety of accessories, further making truck cabs important aspects of the community nutrition environment.

Other sources of food that were cited by drivers were vending machines at company-operated terminals, and truck-accessible restaurants. Participants noted how they use various forms of transportation to access sources of food that are not truck-accessible, including personal vehicles, public transportation, intermodal transportation, and using forms of exercise such as bicycles and running. Several participants noted that exercising to access alternate food sources brought them enjoyment. Overall, drivers noted that limited truck accessibility limits sources of food, restricting the community nutrition environments of drivers.

Organizational Nutrition Environment

The organizational nutrition environment includes environments that are sources of food, such as school, home, and work (Glanz et al., 2005). Because of the unique characteristics of the trucking profession, the lines between home and work are blurred – unlike other occupations, where workers go from workplace to home at the end of the work day, truck drivers spend their downtime in trucking workplace settings and usually are only home one or two weekends a month (Apostolopoulos, Sonmez, Shattell, & Belzer, 2011). Therefore, the majority of the overall nutrition environment is encapsulated within drivers' worksites, including truck stops, company-operated terminals, warehouses, and rest areas.

Glanz and colleagues note how organizational nutrition environments are those that are available to defined groups and not to the general population (2005). Because truck stops, company-operated terminals, warehouses, and rest areas are open to the broader truck driver population, the closest match to an organizational nutrition environment is the driver's "home" – his or her truck cab. It was noted how this is the environment over which they have the most control to change and are their exclusive province. Multiple drivers described their ability to stock up their truck cabs to enable access to healthy food while on the road. This makes sense according to the Model of Community Nutrition Environments, as food within the organizational nutrition environment, including at home, is affected by the availability of food at other outlets.

Consumer Nutrition Environment

The consumer nutrition environment pertains to what individuals are likely to encounter at food sources, such as a restaurant or grocery store, and includes such factors as quality, price, promotion, product placement, variety, freshness, and nutrition information (Glanz et al., 2005). This concept is represented in the themes that were generated from the interviews in the current study.

Participants described the consumer nutrition environment in this current study extensively. Available food sources were characterized in terms of price, quality, freshness, variety, promotion, visibility, and nutrition information; in addition, they expressed many of these qualities by comparing and contrasting healthy and unhealthy foods within these parameters. It was clear that these characteristics were salient to drivers and were powerful factors in their nutrition environments, particularly at truck stops. These characteristics were viewed in respect to resources for eating healthy, as well as barriers to eating healthy. Many drivers also believed that improving these characteristics for healthy food choices represented

important leverage points in making it easier to engage in health-supportive behaviors and live a healthier lifestyle while on the road.

Information Environment

The information environment is independent of the community, organizational, and consumer nutrition environments, and consists of advertising and media (Glanz et al., 2005). In the current study, the information environment concept is reflected in the themes that emerged from the interviews.

Participants noted how healthy foods lack sufficient advertising, contrasting to the high degree of advertising for unhealthy options. They described how the temptation to access sources of unhealthy food is enhanced because of advertisements for fast food in general while on the road – one driver, for example, described the constant stream of billboards along highways advertising for fast food. Combined with the perception of convenience of such options, the information environment as expressed through advertising of unhealthy food options is an important factor in engaging in health behaviors for professional drivers.

Individual Variables

Individual variables include psychosocial factors, demographic factors, and the perceived nutrition environment (Glanz et al., 2005). This also includes individual attitudes towards the community nutrition environment. Within the Model of Community Nutrition Environment, individual variables can mediate or moderate the environmental effects on eating behavior (Glanz et al., 2005). The themes in the current study that were derived from the interview data reflect these individual variables.

Numerous participants noted their perceptions of the nutrition environment in which they are nested as professional drivers. It was noted that healthy food is lacking overall at truck driver

settings, as well as being inconsistent, limited, and lacking in supporting the intake of healthy foods; in addition, participants questioned the motivation of truck stops to offer healthy foods in the first place, noting their top priority is on profit and that unhealthy foods are simply more profitable. Eating healthy in general was perceived to be difficult and a constant struggle, and that consumption of unhealthy foods within the overall community nutrition environment was easier, more convenient, and more tempting. Overall, participants perceived truck stops and truck cabs to be the most important community nutrition environments, with company-operated terminals being perceived as particularly important for company drivers but not for independent drivers.

Many psychosocial and demographic factors relevant to nutrition environments are included in the themes derived from the interviews. The connection between emotion, a psychosocial factor, and eating patterns was discussed. Drivers described the important individual characteristics of being flexible, adaptive, and creative in food intake behaviors. Several important psychosocial characteristics were mentioned; specifically, participants noted lack of motivation, self-consciousness, poor attitude, lack of knowledge about how to live healthy, lack of social networks, and the tendency to fall into a "vicious cycle" or unhealthy eating patterns. Other important individual variables were indicated to be having a long-term perspective on health, having positive social support, avoiding negativity, and mitigating stress were all noted as being important psychosocial factors in relation to food consumption.

Ecological Conceptual Framework of Trucking Obesity

Apostolopoulos et al's (2011) Ecological Framework of Trucking Obesity (Figures 2.16 & 2.17) consists of seven sets of variables: Sociocultural context, transportation environment, individual and background factors, physical activity determinants, diet behavior determinants,

genetics, and outcomes. These seven variables influence driver health outcomes related to obesity. With the exception of genetics, all of these variables are represented in the current study through the themes that emerged from the participant interviews.

Sociocultural Context

The sociocultural context consists of broad forces, including societal, governmental, and market forces, which impact food intake and physical activity. These forces shape available resources, individual access, and infrastructure. Components of the sociocultural context are trends relating to food supply, such as fruit and vegetable availability; nutrition and eating out, including food content and portions; food marketing and pricing; physical activity; leisure activities, including the use of gyms and recreation space; and urban and rural development, including land use, planning, and public transportation (Apostolopoulos et al., 2011). All six of these trends are represented in the themes in the current study that emerged from the interview data.

Food supply trends, nutrition and eating-out trends, and food marketing and pricing trends emerged powerfully across a number of themes with drivers. Participants discussed multiple features of food supply trends within these subthemes, often comparing foods that were perceived as healthy to those perceived as unhealthy within these features. The features discussed by participants often incorporated contrasting health and unhealthy food options available within their settings. These comparisons covered a number of key characteristics, such as quality and freshness, expense, and variety. Drivers specifically spoke of the convenience and temptation of unhealthy food options, and how excessively large portions created barriers to healthy eating. Healthy and unhealthy foods were also described in terms of visibility,

advertising, and promotion. Drivers mentioned the importance of having nutrition information available to aid in making healthy food choices.

For truck stop settings specifically, the differences between independent and chain truck stops, as well as between specific chains, were described along these dimensions. Independent truck stops were seen as being more accommodating in providing health resources, partly due to their ability to be more flexible compared to a nationwide chain. The truck stop chain of TravelCenters of America/Petro was seen as being superior to the Pilot/Flying J chain by most drivers, although drivers did mention improvements at both. Drivers further differentiated between specific aspects within truck stops along these dimensions, describing the food supply trends in convenience stores, buffets, sit-down restaurants, and fast food restaurants as being generally oriented away from healthy eating. Within truck cabs, trends related to being able to store and prepare food within truck cabs were identified. Company-operated terminals were described as far as their provision of, and ability to provide access to, healthy foods, and discussion of warehouses centered on food trends in vending machines. Drivers talked about access to grocery stores, farmers' markets, local meat markets, and restaurants. They indicated that, overall, food supply trends are moving in a healthier direction, although there is still a long way to go.

Physical activity trends were salient to participants. Within truck stop, truck cab, terminal, warehouse, and rest area settings, drivers talked a great deal about engagement in physical activity. Participants described opportunities for physical activity, difficulties in engaging in physical activity, and how settings could be modified to make it easier to obtain physical activity. In concurrence with the Ecological Conceptual Framework of Trucking Obesity, physical activity trends were described in terms of community resources, recreation

space, and health clubs, with participants identifying these trends by referring to areas such as nearby neighborhoods, accessible trails and paths, and accessible gyms. Similar to food supply trends, physical activity trends were described along several dimensions in these various settings. Important characteristics included accessibility, quality, maintenance, variety, sanitation, and information. Truck cabs and warehouses had unique factors which were relevant: For truck cabs, storage space, and equipment were important, and for warehouses the flexibility and support of staff and security were important. As a whole, physical activity trends were described as moving in a positive direction, and were described as being ahead of food supply trends.

Although not as frequently referenced as food supply and physical activity trends, the role of urban and rural development trends were explained by participants as well. Particularly for physical activity, the role of these development trends was important, as many participants sought opportunities for exercise in nearby neighborhoods, paths, and trails. These trends impacted food intake as well. Connectivity between local community resources and trucker settings, especially truck stops, were described as providing ways for drivers to access health-supportive resources, as was community support. Drivers recommended that connectivity and community support be enhanced to make it easier to engage in health-supportive behaviors. Safety, poor connectivity, and poor accessibility were cited as barriers to obtaining healthy food and engaging in physical activity.

Transportation Environment

The articulation of transportation environment variables are where the Ecological Framework of Trucking Obesity is especially powerful for conceptualizing health determinants for truck drivers. These variables constitute much of what makes the truck driving profession unique. Professional drivers operate in a highly-regulated and increasingly-regulated

environment, making the variables within the transportation environment especially impactful. The transportation environment consists of four components: Government regulations, trucking operations, corporate policies in truck driver settings, and the built environment. Government regulations include deregulation and hours-of-service laws. Trucking operations includes such constituents as logistics, market structure, shippers, consignees, company-operated terminals, and warehouses. Corporate policies in truck driver settings pertain to many aspects of these settings, such as infrastructure conditions, resources, truck stops, company-operated terminals, and truck cabs. Finally, the built environment is the spatial and physical characteristics of places such as company-operated terminals and truck stops and includes characteristics such as design, layout, pedestrian services, and access (Figure 18) (Apostolopoulos et al., 2011). These four broad aspects of the transportation environment were included in the themes in this current study.

Government regulations stem from the federal government; specifically, the Department of Transportation and the Federal Motor Carrier Safety Administration. These regulatory bodies dictate many of the policies which impact drivers, including hours-of-service rules. Hours-of-service rules were frequently mentioned, as participants discussed how increased hours-of-service laws in the trucking industry have impacted driver health. As participants described, prior to hours-of-service laws, drivers more often loaded and unloaded their trucks, making the job less sedentary. This has since changed with the advent of these laws, with drivers loading and unloading far less often, making the job increasingly sedentary. Drivers also described the impact of hours-of-service rules on their ability to engage in physical activity. While the impact was viewed differently between participants – some viewed these rules as providing time for exercise, while others cited their lack of flexibility and viewed them as barriers to exercise – it

was clear that they were perceived as an important factor for drivers in their pursuit of health-supportive resources and behaviors. The most impactful hours-of-service rules in these pursuits appeared to be the 10-hour, 14-hour, and 30-minute rules. These rules mandate rest and driving time periods for drivers. The 10-hour rule requires that drivers take 10-hour, uninterrupted breaks, which essentially "reset" their available driving time. The 14-hour rule stipulates that drivers cannot drive 14 hours after they ended their last 10-hour break. Finally, the 30-minute rule states that drivers must take a 30-minute break within the first 8 hours after coming off their last 10-hour break.

Within the transportation environment, trucking operations were identified and described by drivers. Participants talked about how important flexibility and support of shippers and consignees is within warehouse settings in the ability to engage in health-supportive behaviors. Critical characteristics include loading and unloading quickly, the flexibility and cooperativeness of staff and security, and policies in place in these settings. Trucking companies were also identified and described by drivers in alignment with the transportation environment component of trucking operations in terms of logistics, expressed by drivers in reference to their routes. Familiarity with route was described as being a resources, as drivers talked about being able to locate health-supportive resources along their routes. As drivers rarely have control over their schedules or dispatching, the need to maximize available time to engage in health-supportive behaviors, such as by using down time to engage in physical activity, was seen as crucial.

Corporate policies in trucking settings were seen as important factors in engaging in health-supportive behaviors. Previous policies by truck stops were discussed as falling short and resulting in failure for a number of reasons, and several participants referenced these past failures pessimistically as they discussed the perceived trend in the trucking industry toward supporting

driver health. These policies were also described in reference to company-operated terminals and truck cabs, which are settings owned and operated by trucking companies. Company-operated terminals were identified as providing access to health resources through the provision of company vehicles. Company-operated terminals were also referred to through the barriers they place on the ability of drivers to engage in physical activity due to issues around poor quality, lack of permanence, and poor siting of terminal gyms. Participants further described how company policies may reduce the ability to engage in healthy behaviors in truck cab settings, such as by prohibiting accessories, as well as by not assigning drivers their own trucks. These policies also provided barriers to finding opportunities for exercise because of restrictions on out-of-route miles. Further barriers related to trucking company policies were: Failure to offer health and wellness programs, prohibiting pets, lack of loading and unloading freight, inconsistent routes, and being a team driver.

Corporate policies in truck stops were discussed by participants as well, in alignment with the Ecological Conceptual Framework of Trucking Obesity. Policies within truck stops were identified as leading to a generally unhealthy food environment, with participants believing that these policies are guided by the profit motive. Truck stop policies were also described pertaining to physical activity within this same theme and subtheme, including one that discourages walking by providing a shuttle service from the parking lot to the building, and the perception that provision of opportunities as a whole in truck stops were inhibited due to concerns about liability.

Finally, the built environment of the transportation environment was frequently cited by participants, in alignment with the Ecological Conceptual Framework of Trucking Obesity. The built environment of trucker settings includes the physical and spatial aspects of trucking

settings, with the critical features including type, location, design, and layout; spatial distribution of activities; walkability; accessibility and location of community resources and services; aesthetics; and air and water quality (Apostolopoulos et al., 2011). The built environments of trucker settings was frequently described, especially as far as its impact on access to healthy food and physical activity. Especially important here were the suggestions regarding ways to modify the built environments of trucking settings: Not only did participants have a number of ideas on how to accomplish this, the built environment of these settings has the potential to be modifiable. Because of the unique dependence that truck drivers have on their settings, the built environment assumes an added influence in driver health. In a broader sense, changes in the built environment of truck cabs were mentioned as having allowed obese individuals to enter the occupation.

Individual and Background Factors

Individual and background factors are the personal and occupation-related characteristics which influence eating and physical activity. These include sociodemographics, psychosocial properties, occupational factors, and spatial and temporal attributes (Apostolopoulos et al., 2011). These factors appeared to be extremely important to participants, and thus are reflected in multiple themes in this current study, in alignment with the Ecological Conceptual Framework of Trucking Obesity.

Sociodemographics cover a number of characteristics; in the current study, they were cited strongly in terms of income, as truck drivers were described by one participant as emerging from lower-income backgrounds; in his opinion, these drivers' backgrounds resulted in the acquisition of poor health behaviors, such as the consumption of junk food. Social networks were seen as valuable resources, providing motivation through accountability, reinforcement,

information exchange, and even by allowing these healthy drivers to be motivators and inspire other drivers to improve their own health. Personal and family history often motivated participants to be healthy, as several mentioned health issues that were common among other members of their families and a desire to avoid similar outcomes. Occupational factors relate to individual characteristics of drivers as a whole; for participants in this study, many other drivers were characterized as being mavericks, loners, sedentary, and not wanting to put in the effort to live healthy. Finally, spatial and temporal attributes, which refer to trip plans and routes, were described often by participants. Trip planning, and the related factor of scheduling, were seen as critical for accessing health resources. The ability to plan ahead to access health resources, such as grocery stores and places to run and bike, was seen by several drivers as essential. Exercise routines were seen as vital to engaging in physical activity on a regular basis; at the same time, an unpredictable event was seen as a barrier due to its disruption to an exercise routine. Routes were also important for drivers, as predictability of one's route was seen as being advantageous. For many drivers who had predictable routes, they were able to figure out accessible health resources available on their routes and trip plan to take advantage of them.

Physical Activity and Diet Behavior Determinants

Included within individual and background factors are physical activity and diet behavior determinants. Self-efficacy, perceived benefits, supportive environment, attitude towards exercise, modeling, and outcome expectancies are the components of physical activity determinants (Apostolopoulos et al., 2011). Attitudes towards eating, emotional distress, time constraints and pricing, peer pressure, junk-food addiction, and nutrition and diet knowledge make up the array of diet behavior determinants (Apostolopoulos et al., 2011). The themes of

the current study align with these components that compose the determinants of physical activity and diet behavior.

Physical activity and diet behavior determinants appear throughout the themes and subthemes of this study, often overlapping, as drivers often engaged in healthy eating and exercise using similar sets of determinants, including resources and barriers. Several determinants were linked to an overall healthy lifestyle and not specifically to either physical activity or diet behavior. For example, perceived benefits were identified as important to physical activity; however, most participants talked about perceived benefits in a global sense and not just as physical activity determinants. Weight loss and increased energy and metabolism were perceived benefits of an overall healthy lifestyle, including both physical activity and nutrition. Similarly, attitude was described in its role in living a healthy lifestyle overall. Having a positive attitude, avoiding negativity, and taking individual responsibility were all described globally.

Overall, the determinants of physical activity and diet behavior as identified by Apostolopoulos and colleagues (2011) were very well represented in the findings of the current study. One might be struck by the numerous and complex array of determinants of physical activity and diet behaviors identified in this model. The current study suggests that the determinants identified in this model are all important, and that the model may actually underestimate the number of determinants that are important in physical activity and diet behavior decisions.

Outcomes

Outcomes include primary health outcomes, such as obesity; secondary health outcomes, including hypertension and other obesity comorbidities; and other outcomes, such as absenteeism

and occupational hazards (Apostolopoulos et al., 2011). The themes of this current study include features of these three types of outcomes.

Among the three types of outcomes, primary health outcomes were the most frequently discussed. Participants described the perceived outcomes of engaging in healthy behaviors. Lost weight, improved fitness, increased energy, increased metabolism, positive affect, and receiving compliments were some of the outcomes to engaging in health-supportive behaviors that were mentioned. Several drivers also described their perceptions of how their health outcomes have been impacted by their career choice; however, perceptions along this domain were not in agreement. Some drivers felt that their career choice was a barrier and that they would be healthier in another occupation; for others, they noted how they were able to change from an unhealthy to a healthy lifestyle without changing jobs, so they felt that the impact of the occupation was not significant. Also, while some drivers talked about the barriers of being a trucker to engaging in health-supportive behaviors, others focused on the distinct advantages that being a driver had in engaging in such behaviors.

Limitations of the Ecological Conceptual Framework of Trucking Obesity

The Ecological Conceptual Framework of Trucking Obesity is the most comprehensive ecological model of health behavior for the population which was the focus of this study. However, in the context of the present findings, additional components are recommended for inclusion. First, the role of technology appears to be of particular importance to the drivers, impacting access to resources, and motivation. Recent technological advances, such as smartphones, GPS, Google maps, and especially social networking websites, were mentioned repeatedly by these participants. Technological trends appear to be highly influential in drivers' eating and physical activity behaviors.

Other components that should be implemented into the Ecological Conceptual Framework of Trucking Obesity relate to motivational and attitudinal factors. Although this framework does include these factors, it does not fully explicate several particular aspects which were powerfully and often described by participants. For one, participants cited multiple, often co-occurring and overlapping, sources of motivation that drove engagement in healthy behaviors. Sources of motivation came from diverse sources, such as from their social networks, from enjoyment of health-supportive behaviors, from perceived benefits of engaging in health-supportive behaviors, and even from within. These sources of motivation were both external and internal and were temporally diverse as well, including elements from the past, present, and future.

Attitudinal factors that especially powerful to these participants as well, particularly individual responsibility, as well as maintaining positivity. The Ecological Conceptual Framework of Trucking Obesity should be further expanded to fully appreciate the roles of motivation and attitude in health outcomes among truck drivers to serve as a better model for future health promotion efforts. This could be accomplished by incorporating several concepts from the field of psychology.

Motivational and attitudinal factors seem to be critical pathways to enhancing driver health. One potentially useful way to view these factors may be through possible selves. Possible selves provide a way to conceptually link one's self-concept with motivation (Markus & Nurius, 1986). Drivers in the current survey described avoiding negativity and maintaining a positive attitude, which may be an effort to maintain a positive self-concept. They also describe the importance of individual responsibility, which may be a reflection of their attempt to maintain self-efficacy as a part of their self-concept as they strive to engage in health-supportive

behaviors in the face of numerous barriers. Through the concept of possible selves, we can thus establish a connection between drivers' attitudes toward health behaviors and their motivation to engage in such behaviors.

Possible selves originate from representations of the self in the past, and they include representations of the self in the future (Markus & Nurius, 1986). Drivers in the current study viewed self in terms of health in a similar temporal fashion, describing their health statuses in the past. Their representations of their selves in the future was apparent as well. Particularly in terms of motivation, possible future selves may be a powerful way to conceptualize how perceived benefits and outcomes of health-supportive behaviors impact health decisions. Possible future selves represent hopes, fears, and fantasies (Markus & Nurius, 1986). Drivers spoke of the benefits they anticipated from engaging in health-supportive behaviors, as well as the importance of engaging in such behaviors to avoid poor quality of life in the future. Hence, these possible future selves appeared to be powerful motivators in engaging in health-supportive behaviors.

Strengths of the Study

The current study had several strengths. For one, a substantial amount of data were collected in the 12 in-depth interviews. The majority of participants seemed truly excited to discuss their experiences – they were proud of their accomplishments, they seemed to genuinely care about their health and the health of other drivers, and they were eager to share their insights and suggestions about the phenomenon in question. This enthusiasm translated into information-rich interviews, which enabled detailed themes to emerge from findings.

Additional strengths of this study were the philosophies which guided its inception and methodology. For one, this study was strengths-based. In the scientific literature, truck drivers

are generally portrayed by framing the population by its deficits. This study sought drivers who were thriving in their settings and who exhibiting resiliency in the face of barriers. It is reasonable to believe that engaging drivers in this positive way helped to make the interviews as fruitful as they were. Had unhealthy drivers been interviewed, it is likely that insights would have been more limited and more negative.

Another philosophical strength of this study was the use of transcendental phenomenology. Because of the novel, strength-based approach to this population, as well as a general dearth of scholarly research on the phenomenon in question, the transcendental phenomenology approach was particularly powerful in its ability to gain insight into the phenomenon in question. By meticulously setting aside pre-judgments and allowing the participants to guide the revelation of information during interviews, an abundance of information was gained from the study – information which was not artificially bound to existing theory or preconceptions, but rather that spanned multiple levels, domains, and contexts of influence.

Limitations of the Study

One limitation of this study relates to the incredible diversity of the truck driver population as a whole. A number of relevant job and company characteristics to driver health were revealed in the answers of participants, including those related to route, company, equipment, experience, and gender. While generalizability was not a goal of this research, and the sample included in this study represented a wide range of relevant characteristics, it is possible that other drivers in different contexts may have novel or even divergent experiences as healthy drivers and have insight that differs from the drivers included in this current study.

Another limitation of this study relates to the diversity of the transportation and material moving sector as a whole. This particular study focused on long-haul truck drivers. Long-haul truck drivers represent only a fraction of the trucking industry as a whole, which, in turn, is only one of many occupations which constitute the transportation and material moving sector. Other occupations within this sector include bus drivers, delivery truck drivers, hand laborers, and material moving machine operators, just to name a few. Not only do ground transportation occupations fall within this sector, but also occupations involved in modes of transportation by air, sea, and land. However, many of the occupations within the transportation and material moving sector have mutual characteristics; for example, much like long-haul truck drivers, many of these occupations operate in a highly regulated environment. Thus, findings from this current study may be relevant to other occupations within the sector.

Additionally, the trucking settings in which drivers operate, ranging in level of influence from truck cabs to the overall culture of the industry, are constantly in flux. Changes in economics, regulations, and knowledge of the importance of driver health and fitness mean that this study only represents a "snap shot" in time. Multiple drivers expressed the temporality of the current state of barriers and resources, describing current changes in the industry and their expectations of the future of the industry as well.

Future Research

The purpose of this research was to understand the lived experience of being a healthy truck driver in endemically obesogenic occupational settings. The insights gained as a result of this exploratory study suggest numerous future avenues for research. The complex themes that emerged from this study, combined with an overall limited research base on this population, point to the need for further research into truck driver health and wellness. Much can be learned

from this unique population that would be helpful – not just to truck drivers, but also to workers in other occupations that do not naturally encourage health-supportive behaviors.

Future research should include further qualitative studies. For one, case-study approaches, using multiple sources of data to triangulate findings, could further elucidate the barriers and resiliency factors that were explored in this study. Case studies could be employed in multiple sites, or even within a single company. Also, given the limited theoretical background on truck driver health and wellness, as well as the findings of the current study which identify an array of unique health behavior determinants for truck drivers, a grounded theory qualitative study is warranted. Grounded theory approaches generate theories which are "grounded" in data from participants, resulting in explanations that are shaped directly from the input from a large number of participants who have experienced the topic (Creswell, 2013). This would enable the development of a theoretical framework, which could then guide future research efforts.

Future quantitative studies could address numerous important domains of driver health. One dire need for quantitative work is in evaluation of driver health and wellness programs. A virtual lack of evidence-based practice occurs in this domain, particularly around areas of summative evaluation. Quantitative studies about the efficacy of these programs could be impactful by establishing best practices, identifying relevant contextual factors, enabling the exchange of information between stakeholders and reducing the isolation in which companies engage in such efforts, and provide cost-benefit measures.

An avenue for a qualitative/quantitative mixed-method approach in this domain is asset-mapping. Drivers identified a number of health-supportive resources, many of which are not visible in the daily routines of typical truckers. These resources include truck-accessible grocery

stores, restaurants, and opportunities for physical activity, as well as nearby trails, gyms, and walking paths that are accessible from truck stops, company-operated terminals, and warehouses. Engaging in a participatory asset-mapping process could provide a directory of this extremely useful information, which could then be disseminated to trucking companies and independent drivers to increase their ability to live healthy on the road.

Implications of Findings for Theory Development and Policy

The results of this study suggest a dynamic set of multiple factors, spanning multiple domains and levels of influence, which enable or restrict health-supportive behaviors. Current assumptions of many approaches to intervening in driver health, such as company health and wellness programs, underestimate the complexity of the root causes of driver health, as most occupational health issues function as complex and adaptive nonlinear dynamic systems; hence, the interventions generated under the auspices of these assumptions usually only generate underwhelming and unsustainable impacts on driver health (Apostolopoulos, Lemke, Perko, Sonmez, & Hege, 2012). A new paradigm to understanding and intervening in driver health, The Integrative and Dynamic Healthy Commercial Driving (IDHCD) paradigm, provides a theoretical framework that embraces this complexity, with the potential to change policy and health behavior significantly.

The new paradigm is based on three mechanisms. The first is the integration of intervention and prevention measures of the primary, secondary, and tertiary types (Apostolopoulos et al., 2012). Multiple approaches to prevention and intervention are called for under the IDHCD paradigm and could include programs such as risk assessments, risk monitoring, disease monitoring, risk mitigation, and risk management (Apostolopoulos et al.,

2012). Such efforts can have large impacts on driver health and wellness (Apostolopoulos et al., 2012).

The second mechanism is an inclusive mental framework that incorporates multiple, multilevel, complex, and interacting components, emphasizing upstream domains as root causes, influencing not just truckers, but the transportation sector and the general population (Apostolopoulos et al., 2012). For example, when discussing the IDHCD paradigm in reference to cardiometabolic disease, there are five identifiable broad causal pathways: 1) Trucking conditions, such as hours-of-service regulations, pay, and time management issues; 2) Nonwork conditions, such as work-life conflict; 3) Community and stakeholder strength, including health protecting and promoting resources; 4) Truckers' lifestyles; and 5) Truckers' cardiometabolic disease burden, which includes obesity, risk prevalence, and related financial costs (Apostolopoulos et al., 2012). These five pathways are mutually interactive. Identifying the feedback mechanisms among the multiple causal domains is critical, and these mechanisms may be multilevel, diverse, evolving, or time-delayed (Apostolopoulos et al., 2012). The mutual nonlinear interactions and bidirectional loops included in this framework produce new, non-proportional properties, while maintaining the system and its environment in a state of constant co-change, that are not captured by traditional approaches (Apostolopoulos et al., 2012).

The third mechanism of this paradigm is inclusion of multiple key stakeholders, across multiple levels of influence, with an understanding that consensus among them leads to increased synergies and improved outcomes (Apostolopoulos et al., 2012). The IDHCD paradigm involves the development of causal-loop-diagrams, which are models of systems that are simplified representations of parts of reality (Homer & Hirsch, 2006). These diagrams are developed early in the model-building process and require identifying important factors, where these factors

come from, why they persist, and, by connecting these factors in chains of cause-and-effect until feedback loops are formed, how they interact (Apostolopoulos et al., 2012). The development of causal loop diagrams is most effective when it occurs through an iterative and participatory process, one which involves diverse key stakeholders and a conscientious effort to build consensus (Andersen, Richardson, & Vennix, 1997). Stakeholder involvement is also critical for pragmatic reasons, as they will be the responsible parties for initiating interventions based on these models (Vennix, 1999). Because diagram development includes a wide array of factors and issues being considered, they offer a superior starting point for initiating interventions (Apostolopoulos et al., 2012).

The resulting causal loop diagram is then translated into stocks-and-flows diagrams and differential and algebraic equations, which then become the basis for simulation models (Sweeney & Sterman, 2000). Simulation models allow for a more accurate prediction of the effects of interventions in the dynamic and complex environments in which they are implemented, where pathways between intervention and outcomes may be delayed, indirect, or possibly affected by nonlinearities (Levy et al., 2011). Simulation testing allows for an increased understanding of how health trajectories may change under different configurations of driver health and wellness programs (Apostolopoulos et al., 2012).

The Integrative and Dynamic Healthy Commercial Paradigm could shift policy to better support driver health. Because the environment in which drivers operate is highly regulated, policies are highly impactful. Implementation of the principles of this paradigm can provide a means to measure the impacts of policy on driver health outcomes. For example, simulation models could be developed for examining the impacts of hours-of-service rules on driver health outcomes. The impacts various configurations of hours-of-service rules on driver health

trajectories could then be theoretically examined. Similarly, this paradigm could translate to improve health and wellness programs. For example, it may be the case within trucking companies that they would like to address driver health, but they may feel that they have limited resources. The development of a simulation model could allow for testing of the most impactful way to address driver health within limited resources. These models could also be used to improve or expand existing health and wellness programs in the most effective and efficacious way possible. Especially given the highly competitive nature of the trucking industry, using simulation models to maximize return-on-investment is of vital importance.

Conclusions

The importance of health promotion, particularly around issues of obesity, is considered the most important and most impactable health issue of the next 20 years. Addressing the contexts in which individuals engage in health behaviors is key in reducing the financial, health, and quality-of-life impacts of health behaviors related to obesity (Finkelstein, Trogdon, Cohen, & Dietz, 2009; Story, Kaphingst, Robinson-O'Brien, & Glanz, 2008; "The Surgeon General's call to action to prevent and decrease overweight and obesity," 2001). Health promotion in the workplace will continue to be a critical avenue, given the ability of such efforts to reach a large number of individuals and impact distal factors that influence health (Goetzel & Ozminkowski, 2008; Green, Poland, & Rootman, 2000).

The concept of setting is core to health promotion. Settings have definable structures, routines, and pathways of change; are temporally stable; are concise; are easier to operationalize than populations or communities; and provide conceptual boundaries for understanding the contexts of health behaviors (Dooris, 2012; Green et al., 2000). Thus, a settings approach to health promotion provides a number of benefits and advantages over other failed approaches,

such as educational campaigns or strengthening the willpower of individuals. Because full-time employees spend nearly half of their waking hours and consume a large portion of their daily food intake in occupational settings, these settings are critical in health promotion efforts (Larson & Story, 2009). Truck drivers represent an even more extreme case, as they are particularly dependent on, and vulnerable to, the resources and barriers of their occupational settings (Apostolopoulos et al., 2011). Thus, much can be learned from this unique population, especially from individuals who overcome these barriers.

Participants in this study revealed a complex array of resources, barriers, suggested changes, attitudinal and motivational factors, and influences of the broader trucking culture. Many responses identified leverage points – ranging in ease of alteration or implementation – which could advance driver health. For example, one apparently easy change is in the domain of information provision. Many drivers suggested that truck stops provide information, such as maps, on nearby opportunities for physical activity. This seems to be "low-hanging fruit," requiring little financial cost and capitalizing on existing resources. Drivers also acknowledged the impact that minor modifications to truck cabs could have, such as companies providing inverters, allowing drivers to remove unused passenger seats, and installing low-cost in-truck exercise equipment. Taking advantage to these low-cost leverage points can make meaningful positive impacts in the ability of drivers to access resources and overcome barriers to engaging in health-supportive behaviors.

Leverage points across more distal levels of influence were identified by participants as well. Because of the mutually interactive nature of the levels of influence of health behaviors, successfully intervening will ultimately require broader change, across multiple settings. Fortunately, participants discussed how truck stops, company-operated terminals, trucking

companies, and even the head of the Federal Motor Carrier Safety Administration are open to hearing suggestions, willing to implement suggestions, and are more conscious of driver health issues than ever before. The critical task is to find ways to advocate for health-supportive changes within these broader domains. One avenue to enact these changes, according to participants, may be through the advocacy of drivers themselves.

The results from this study reveal how complex the determinants truly are (Apostolopoulos et al., 2011). The concept of "setting" extends beyond truck stops and truck cabs to such domains as the trucking culture as a whole, trucking companies, the regulatory environment, and social networks. It is essential to advancing driver health that comprehensive approaches that are grounded in settings and ecological models of health behavior be developed and implemented. Several participants acknowledged past failures in attempting to improve driver health, and failure to intervene successfully again could be a significant blow to the momentum toward driver health that many drivers see as building throughout the trucking industry. Lessons learned and knowledge gained from the implementation and evaluation of these efforts can inform and improve efforts in other workplaces and communities as well, generating superior approaches to health promotion.

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APPENDICES

APPENDIX A

INSTITUTIONAL REVIEW BOARD APPROVAL

Date: April 1st, 2013

Principal Investigator: Greg Meissen, Ph.D.

Co-Principal Investigator: Michael Lemke

Department: Psychology, Box 34

IRB Number: 2895

The University Institutional Review Board (IRB) has reviewed your research project application entitled:

"Understanding and Overcoming Barriers in Unhealthy Settings: A Phenomenological Study of Healthy Truck Drivers"

and approved the project according to the Federal Policy for the Protection of Human Subjects. As described, the project also complies with all the requirements and policies established by the University for protection of human subjects in research. Unless renewed, approval lapses one year after approval date.

Please keep in mind the following:

1. Any significant change in the experimental procedure as described should be reviewed by the IRB prior to altering the project.
2. When signed consent documents are required, the principal investigator must retain the signed consent documents for at least three years past completion of the research activity.
3. At the completion of the project, the principal investigator is expected to submit a ***final report***; the form is attached.

Thank you for your cooperation. If you have any questions, please contact me at ext. 6945.

Sincerely,

Michael Rogers, Ph.D.
Chairperson, IRB

Wichita State University, Wichita, Kansas 67260-0007 Telephone: (316) 978-3285 Fax: (316) 978-3750

APPENDIX B

INFORMED CONSENT FORM

Purpose: You are invited to participate in a study of healthy truck drivers. We hope to learn what healthy truck drivers see as barriers in staying physically healthy, such as eating nutritious food and engaging in physical activity, while on the road and how truck drivers are able to stay healthy while on the road despite these barriers.

Participant Selection: This study is anticipated to include 12-15 individuals. You were selected as a possible participant in this study because you have been identified as someone who has successfully maintained a healthy weight and avoided obesity-related disease while being a truck driver for at least the past three consecutive years.

Explanation of Procedures: If you decide to participate, you will either be interviewed in person or be contacted via telephone for the purposes of an interview. This interview will be no longer than two hours and focus on your perceptions of barriers to healthy living while on the road and how you are able to overcome these barriers. If necessary, a follow up interview will be conducted for no longer than one hour. The interview will also be audio recorded.

Discomfort/Risks: The only expected discomfort/inconvenience would be the time it takes to complete the interview process.

Benefits: The primary benefit of this research is that our findings will increase our understanding of the best ways to improve truck driver health. This can help in creating more effective interventions to support driver health, especially by changing the daily environments truck drivers operate in, such as truck stops.

Confidentiality: The interviews will be recorded and transcribed and the information will be retained by the research team until it is no longer needed at which time it will be destroyed. Any personal information obtained in this study in which you can be identified will remain confidential and will be disclosed only with your permission. Your perceptions of barriers to

healthy living and how you overcome those barriers will be included in the final report, along with others interviewed.

Refusal/Withdrawal: Participation in this study is entirely voluntary. Your decision whether or not to participate will not affect your future relations with Wichita State University. If you agree to participate in this study, you are free to withdraw from the study at any time without penalty.

Contact: If you have any questions about this research, you can contact Greg Meissen or Michael Lemke at 1845 Fairmount Box 34, Department of Psychology, Wichita State University, Wichita, KS, 67260. You can also contact us via email at greg.meissen@wichita.edu or mxlemke@wichita.edu. If you have questions pertaining to your rights as a research subject, or about research-related injury, you can contact the Office of Research Administration at Wichita State University, Wichita, KS 67260-0007, telephone (316) 978-3285.

You are under no obligation to participate in this study. Your oral consent indicates that you have read the information provided above and have voluntarily decided to participate.

You will be able to have a copy of this consent form sent to you electronically or by U.S. mail to keep.

_____

Name of Subject

_____

Date

□ Check if oral consent given

APPENDIX C

PARTICIPANT SCREENING SHEET

Participant Screening Sheet

If participant does not meet criteria, use alternate interview guide.

Thanks for taking the time to speak with me. I'll be asking you some questions about trying to be healthy while you're on the road. Before we get started with our interview I would like to ask you some quick questions. Would that be alright? _____ (**Yes**)

1. Phone Number: _____
2. Age: _____
3. Gender: _____
4. Marital Status: _____
5. Average Miles Driven Per Week: _____

6. For how many consecutive years have you been driving a truck? _____ (**3 or more**)
7. Are you an over-the-road driver? _____ (**Yes)**

Physical Activity Questions

8. Do you exercise regularly? _____ (**Yes**) (*if* **No**, *continue to questions 4 – 6 until this **No** is confirmed*)
9. How often do you exercise? _____
10. What do you do to exercise? _____
11. Are you able to exercise regularly when you are on the road? _____ (**Yes**)

Nutrition Questions

12. So, what do you eat most days when you are on the road?

_____

_____

13. How much fruit do you eat most days while on the road? _____ (**2+ Servings**)
14. How many servings of vegetables do you eat most days while on the road? _____ (**2+ Servings**)
15. Would you say you were able to eat healthy during the last week you were on the road? _____ (**Yes**)

Other Questions

16. Do you smoke? _____ **(No)**
17. How tall are you? _____
18. What do you estimate your current weight to be? _____

    *BMI: (Weight) * 703 / (Height in inches)^2 =* _____ (**<30**)

19. Has your weight increased during the past 3 years? _____ (**No**)
20. During the past 3 years, have you been diagnosed with high blood pressure, high cholesterol, diabetes, or any other health issues? _____ (**No**)

APPENDIX D

QUALITATIVE INTERVIEW GUIDE

Participant interviews for understanding and overcoming barriers in unhealthy settings.

Date of Interview: _____

Name of Participant: _____

The Lived Experience Truck Drivers Sustaining Healthy Behaviors in Extreme Obesogenic Environments

I want to understand how drivers stay healthy in work settings that are unhealthy.

1. What do you do to be healthy while working as a driver?

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a. Probe eating behaviors: *How do you go about achieving a balanced, healthy diet while on the road?*
    i. General eating patterns
    ii. Fruit and vegetable consumption
    iii. Limiting fat intake
    iv. Achieving a balanced diet
b. Probe physical activity behaviors: *How do you find opportunities for physical activity?*
    i. Regular/everyday physical activity
    ii. How often and for how long

iii. What types of physical activity they engage in

2. What challenges do you face which may make it difficult to stay healthy while on the road?

3. What, if anything, do you think makes drivers who are able to live healthy while on the road different from drivers who aren't able to live healthy while on the road?

4. What is the hardest thing about staying healthy as a truck driver?

5. How influential do you feel that everyday places you visit while on the road (truck stops, warehouses, company-operated terminals, rest areas, truck cabs) are in how healthy or unhealthy truck drivers are?

6. What should be changed in everyday places you visit while on the road (truck stops, warehouses, company-operated terminals, rest areas, truck cabs) to make it easier to stay healthy?

_____

_____

_____

_____

_____

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_____

_____

_____

a) Probe nutrition: *How could these places help drivers to eat healthy?*

    a. Truck stops

    b. Truck cabs

    c. Rest areas

    d. Warehouses

    e. Company-operated terminals

    f. Company facilities

b) Probe physical activity: *How could these places make it easier for drivers to get more exercise?*

    a. Truck stops

    b. Truck cabs

c. Rest areas

d. Warehouses

e. Company-operated terminals

f. Company facilities

7. Overall, how do you feel that your career as a truck driver has impacted your ability to be healthy?

_____

_____

_____

_____

8. Thank you so much for taking the time to let me talk to you! Would it be okay if I contacted you later with any questions I may have? _____
9. Do you know of any other healthy drivers who may be interested in talking to me as well? _____
10. (*if YES to question 15*) Great, can you tell me their name?

    _____

11. (*if YES to question 15*) Do you mind giving me their phone number or email address?

    _____

Thanks again. Feel free to contact me at any point if you have any questions or comments. Drive safe, and have a great day!