In stark contrast to individual-level approaches to health promotion, ecological approaches target multiple influences of health behavior, because changing individuals and their behaviors may be temporary without corresponding changes to the environment in which they are embedded. Using an ecological approach, supportive environmental factors are considered when designing effective and sustainable health promotion programs.

OBJECTIVES

1. Describe the basic considerations of ecological models of health and behavior.
2. Articulate differences and similarities between various ecological models.
3. Describe the application of ecological thinking to a health problem or behavior.
4. Understand the differences between ecological approaches, multilevel approaches, and structural-level approaches to health promotion.
Introduction

Just as the world has changed rapidly, the approaches used in public health have also taken a dramatic turn in recent years. As the prevention of disease continues to be a primary challenge of public health, health promotion professionals have increasingly turned their attention to solutions that can make positive, sustainable changes. Ecological approaches to health promotion target multiple environmental influences of health (e.g., availability of fresh foods, access to outdoor recreation facilities, walkability of sidewalks) and often involve long-standing changes to physical, legal, economic, and social environments; thus, they are quite strong and enduring.

This chapter is perhaps one of the most important chapters in this textbook. As such, we want to begin with the poignant example of America's obesity epidemic. The following text is taken directly from a Centers for Disease Control and Prevention (CDC) report:

Approximately two-thirds of U.S. adults and one-fifth of U.S. children are obese or overweight. Being either obese or overweight increases the risk for many chronic diseases (e.g., heart disease, type 2 diabetes, certain cancers, and stroke). Reversing the U.S. obesity epidemic requires a comprehensive and coordinated approach that uses policy and environmental change to transform communities into places that support and promote healthy lifestyle choices for all U.S. residents. Environmental factors (including lack of access to full-service grocery stores, increasing costs of healthy foods and the lower cost of unhealthy foods, and lack of access to safe places to play and exercise) all contribute to the increase in obesity rates by inhibiting or preventing healthy eating and active living behaviors. (Centers for Disease Control and Prevention [CDC], 2009)

As you can quickly see from this CDC report, obesity may be an epidemic that is only amenable with an ecological solution. Although the value–expectancy theories you learned about in Chapter 4 may provide some direction in changing both diet and exercise behavior, programs of this type generally fail to produce long-term behavior change because of the countervailing environmental influences. Considering the new public health perspective, which takes into account the impact of the environment on individual health, it is clear that the obesity epidemic will require organizational and policy changes that reach deep into society. Figure 11-1 illustrates specific ecological determinants that should be targeted.

The basic premise of ecological thinking is that health, behavior, and their determinants are interrelated. Ecological thinking has always been an important influence on health promotion. Bronfenbrenner’s (1979) contribution to an ecological approach in health promotion is one of the most important, and perhaps the best known ecological model would be the PRECEDE–PROCEED Planning Model (developed by Green and Kreuter [2005], see Chapter 3). According to these and other models, ecological approaches foster behavior change through targeting the environmental factors that are most likely to influence people’s decisions and actions.

The purpose of this chapter is to describe the characteristics of ecological models, introduce several models or frameworks that describe ecological relationships, and discuss how ecological thinking and models can be used to guide health promotion.

The primary function of an ecological approach is the use of every available means that has a reasonably strong potential to ultimately contribute to lasting behavior change. Although inter-
vening with individuals, families, and even entire communities may not be a novel idea in public health, the concept of changing key aspects of the environment is an emerging paradigm. In many cases, changes to the environment can become powerful influences on health behavior; thus, one increasingly important role taken on by the public health practitioner is to become an advocate for changes in policy, regulation, and legislation that enhance people’s long-term adoption of health-protective behaviors.

One way to understand and develop an appreciation for ecological thinking is to consider the limitations of an alternative model, the medical model. In the medical model way of thinking, obesity is viewed as a medical condition amenable to medical intervention (e.g., gastric bypass, gastric stapling, fat-blocking drugs). Note that these types of medical interventions are delivered by physicians at the individual level, that is, each patient is treated in the office one at a time. These medical treatments may be effective for each of those individuals; however, the population as a whole will not benefit and the underlying root causes remain unaddressed. Thus, the obesity epidemic continues and is not ameliorated. As we stated earlier, there are many other factors involved in the obesity epidemic other than “people eating too much.” Environmental factors such as the ubiquity of fast food restaurants; the shift from outdoor play to more sedentary, indoor activities such as video games and computer screen time; and neighborhoods lacking in walkability and safety are all significant contributors. The ecological approach, unlike the medical approach, avoids blaming the person and emphasizes the complexity of certain health behaviors. The ecological and contemporary perspective is that behavior is influenced by many factors at multiple social levels, and therefore changes directed at multiple levels are needed.
Ecological models have evolved over the past several decades as a consequence of lessons learned in earlier health promotion programs. Some of these lessons have been learned the hard way—through failure. For example, in the 1980s and 1990s, the U.S. federal government spent a large sum of money testing community-level intervention programs designed to prevent heart disease. Some of the larger studies were titled the Multiple Risk Factor Intervention Trial (Stallones, 1983) and the Community Intervention Trial for Smoking Cessation (Anonymous, 1995). The unfortunate reality was that none of these large-scale trials actually worked because they failed to target relevant environmental factors. However, on the positive side, failure can be constructive when the reasons for failure are brought to the surface. In fact, failure is often a vital part of the scientific process and can be a catalyst for change. Thus, for these large, community-level intervention studies, essential lessons should and can be learned. For example, intervention efforts, albeit large-scale initiatives, that do not attempt to alter relevant environmental factors will not succeed in changing behavior. In the absence of creating supportive environments, behaviors such as overeating may become normative, thereby perpetuating a risk environment. The concept of a “risk environment” was captured eloquently by Link and Phelan (1995) when they described how environments contribute significantly to behavior because they essentially set the stage for people to engage in the unhealthy or risky behavior. The concept is actually quite simple: some environments foster more risk behaviors than others. A good example might be the lack of environmental tobacco smoke laws. In the absence of work-place policies that prohibited smoking, it was easy for people to light up, even if they had attempted to quit. Thus, not targeting the social environment is a likely reason for the failure of some of these large-scale heart disease prevention programs. Environmental factors exert tremendous (and unmitigated) influence on people to engage in risk behaviors, despite the best efforts of the intervention program (McKinlay & Marceau, 2000).

In thinking about the concept of people being at risk for unhealthy behavior, it is immediately obvious that many diseases may in fact have a social etiology, meaning that the underlying cause of the disease lies in the sociocultural environment. Heart disease, for example, has social etiologic roots in the structure and lack of regulation of the food industry, the tobacco industry, and the cultural tradition of sedentary lifestyles. The important point here is that public health scholars are increasingly cognizant of these environmental influences. The desire to change these factors is indeed a key aspect of an ecological approach to health promotion. For additional information on the basis of ecological approaches, please refer to: Glass & McAtee, 2006; Krieger, 1994; Susser & Susser, 1996; Link & Phelan, 1995.

In contrast to most of the theories presented in this textbook, ecological models tend to be more conceptual than theoretical, although theory certainly informs them. In this textbook we have chosen to focus on a few selected models. First, we will introduce Bronfenbrenner’s (1979) Model of Human Development, which has provided sustained and widespread influence on thinking about the multiple and interacting social influences on human development. The next several models are Social Action Theory and the Theory of Triadic Influence, which are
reconceptualizations of social cognitive theory (see Chapter 8). The models by Hovell, Wahlgren, & Adams (2009) (behavioral ecological model) and Cohen, Scribner, & Farley (2000) (structural model of behavior) emphasize the structural aspects of the environment and originate mainly from operant conditioning and social cognitive theory.

**Key Concepts**

**Bronfenbrenner’s Model of Human Development**

Bronfenbrenner (1979) was primarily interested in how human development is influenced by the social system. In this context, development refers mainly to psychological and social dimensions of development, which of course are important aspects of health. He noted the substantial influences of parents and family on child development, in addition to the broader societal influences of community and other social and structural influences. Furthermore, Bronfenbrenner stated that the social ecology of human development involves the study of mutual transactions between human beings and the properties of the environmental systems in which they interact throughout their life. Bronfenbrenner suggested that the fit between the person and the environment influences successful development and identified four important system levels: microsystem, mesosystem, exosystem, and macrosystem. Table 11-1 provides a description of these four environmental systems. You may recall that we first introduced you to this model in Chapter 2 (you may want to look at Figure 2-2, the diagram of Bronfenbrenner’s socioecological model, in that chapter again).

The social ecology of human development involves the study of mutual transactions between human beings and the properties of the environmental systems in which they interact throughout their life.

<table>
<thead>
<tr>
<th>Ecological Level</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microsystem</td>
<td>This level refers to the immediate environment in which a person is operating; it is a dynamic system in which the person is affected and in turn affects the environment.</td>
<td>Family, classroom, peer group, neighborhood.</td>
</tr>
<tr>
<td>Mesosystem</td>
<td>This level refers to the interaction of two microsystem environments.</td>
<td>Family affecting an adolescent’s peer group.</td>
</tr>
<tr>
<td>Exosystem</td>
<td>This level refers to aspects of the environment in which an individual is not directly involved, which is external to his or her experience, but nonetheless affects him or her.</td>
<td>Parents’ workplace, economic state of community, parents’ marriage.</td>
</tr>
<tr>
<td>Macrosystem</td>
<td>This level refers to the larger cultural context, including issues of cultural values and expectations, in which the other systems function.</td>
<td>Values, laws, resources, customs of a particular culture.</td>
</tr>
</tbody>
</table>
According to Bronfenbrenner, people develop positive and negative behaviors through their interactions, both direct and indirect, with these systems. These systems may serve to constrict and/or promote healthful development. Consider, for example, intimate partner violence (IPV). Much research in the past 30 years has been conducted to understand why men perpetrate violence against their loved ones. Findings suggest that although some men who commit IPV may exhibit some type of psychopathology, most researchers agree that cultural factors such as patriarchy and lack of social and legal sanctions for batterers contribute to the behavior. Also, in some cultures, IPV is normative and acceptable.

Using Bronfenbrenner’s model, addressing IPV would entail enacting new laws and policies that punish the behavior (macrosystem); promoting the emergence of new social norms that are unsupportive of IPV, perhaps through a national media campaign (macrosystem); implementing workplace policies that support court-ordered temporary restraining or protective orders so that an abusive husband would be arrested if he came to his wife’s place of work (exosystem); and implementing school-based educational programs that promote egalitarian relationships and zero tolerance for IPV (microsystem). In many ways, Bronfenbrenner’s thinking about these multisystem influences on development has become a fundamental framework guiding many areas of social science and practice, including health education and health promotion, social work, child development, and sociology.

**Social Action Theory**

Social action theory (SAT) provides an integrative view of health behavior (Ewart, 2009). According to SAT, enduring behavior change will occur as a consequence of psychological regulation and goal-directed action. Psychological regulation is defined as a person having control over his or her personal environment and interpersonal milieu. Think of this as having the ability to make changes that involve everyday circumstances people face at work, at home, and elsewhere. Lacking control over one’s environment would translate into an inability to engage in self-adaptive behaviors. People living in impoverished areas often experience this lack of control, as well as when there are significant health disparities or gender inequities in a community. Thus, interventions should be directed toward empowerment so that people may gain more or some control over their personal environment.

The second element of SAT, goal-directed action, is achieved by making and following plans to turn a given action into a daily habit. For example, consuming five servings of fruit and vegetables a day would require a plan, as well as relevant environmental supports (i.e., availability of affordable fresh foods) to create a daily habit. SAT also suggests that a person’s beliefs and attitudes tend to align with his or her goals. From an intervention point of view, SAT proposes that we target both aspects: relevant environmental supports plus the underlying cognitive structures.

According to SAT, the initial plan to pursue a new habit will most likely be refined based on both successful and failed experiences. Ultimately, action plans become incorporated into daily routines and these routines become what SAT calls adaptive self-endeavors. The newly diagnosed diabetic, for example, may plan and implement dietary changes designed to protect his or her health from further deterioration. This could involve changes in food shopping, trying
new foods and recipes, and eliminating old unhealthy foods. Success may eventually come, but only through trial and error. If a new healthy diet is finally achieved, then the new dietary pattern will more than likely persist given appropriate environmental supports. The concept of adaptive self-endeavors is important because it seeks to describe how goal-directed behavior is shaped by experience.

Social action theory states that long-term behavior change depends on the interaction of the microprocesses of change, goal-directedness, and the macroenvironment. Ewart (2009) noted that:

Health goals and habits are embedded in a larger matrix of aims that humans in all cultures pursue daily; they include striving to maintain basic biological functions, to build and nurture social connections, and to accumulate and preserve material resources that serve adaptive ends (Ewert, 2009, p. 363).

Although the emphasis on goal-directed behavior is clearly a central tenet of social cognitive theory, SAT offers useful insight into the interaction of self-directed behavior as it is shaped by the environment and experience. SAT puts forth a simple model for promoting sustained behavior change. It suggests that health behavior change depends on all of the systems that define a person's daily existence, family, work, community, and so on, and altering these systems is often necessary for sustained change in health behavior.

SAT proposes a three-step approach to behavior change (see Figure 11-2). First, the behavior change goal should be defined in terms of desirable or undesirable habits. In this step, the social and environmental influences that cue or reinforce the habits are identified and modified. This first step also involves identification of the self-endeavor or goal-directed routine that is

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**KEY CONCEPTS**

Social action theory states that *long-term behavior change depends on the interaction of the microprocesses of change, goal-directedness, and the macroenvironment.*

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**FIGURE 11-2** Three-step approach to behavior change.

- **Step 1:** Define change goals
- **Step 2:** Self-change motivated through cognitive changes
- **Step 3:** Restructure environmental context
served by the habit. In the second step, self-change is motivated through cognitive changes in self-efficacy, outcome expectancies, and self-regulatory ability. In step three, environmental contexts are restructured to support goals, influence mood states, and to foster the social interactions needed to support the desired habit. According to SAT, successful alteration of environmental influences can cultivate self-control and resilience.

**Triadic Influence**

The Theory of Triadic Influence (TTI) (Flay, Snyder, & Petraitis, 2009) borrows from and builds on the ideas of Bronfenbrenner and Bandura. The theory states that three streams of influence can be used to conceptualize the different environmental factors and levels that affect behavior.

1. The *intrapersonal* (personal) stream includes constructs such as self-control, self-determination, and competence.
2. The *interpersonal* (social) stream includes influences such as peers, school, work, and friends.
3. The *sociocultural environment* (environmental) stream represents the macroenvironment and includes influences such as the media, social organization, and culture.

Within each stream of influence (personal, social, and environmental), two substreams—cognitive/rational or affective (meaning emotion based)—can influence behavior. The TTI proposes that factors from each stream can be arranged by three different levels of causation, creating a $3 \times 3$ matrix of possibilities: ultimate, distal, and proximal. This matrix is presented in Table 11-2.

Underlying or ultimate causes of behavior would include variables from the three streams of influence such as culture, neighborhood poverty, or personality. Proximal causes have direct

<table>
<thead>
<tr>
<th>Streams of Influence</th>
<th>Sociocultural/Attitudinal</th>
<th>Social/Interpersonal</th>
<th>Intrapersonal</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ultimate</strong></td>
<td>Class conflict</td>
<td>Social control (Elliott)</td>
<td>Biological theories</td>
</tr>
<tr>
<td></td>
<td>Low SES</td>
<td>Family systems (Brooks)</td>
<td>Psychoanalytic theories</td>
</tr>
<tr>
<td></td>
<td>Anomie</td>
<td>Parenting styles</td>
<td>Resilience</td>
</tr>
<tr>
<td></td>
<td>Social disorganization</td>
<td>Peer clustering (Oetting)</td>
<td>Personality theories</td>
</tr>
<tr>
<td></td>
<td>Strain theory (Merton)</td>
<td></td>
<td>Self-control</td>
</tr>
<tr>
<td></td>
<td>Radical theories</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Distal</strong></td>
<td>General knowledge</td>
<td>Social attachment/bonding</td>
<td>Personal competence</td>
</tr>
<tr>
<td></td>
<td>Cultural identity</td>
<td>Social development (Hawkins)</td>
<td>Self-esteem theories</td>
</tr>
<tr>
<td></td>
<td>Values theories</td>
<td>Differential association</td>
<td>Self-dverification (Kaplan)</td>
</tr>
<tr>
<td></td>
<td>Motivation theories</td>
<td>Social learning</td>
<td>Personal control theories</td>
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<td></td>
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<td>Social support theories</td>
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<td></td>
<td></td>
<td>Social comparison theories</td>
<td></td>
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<tr>
<td><strong>Proximal</strong></td>
<td>Expectancy theories</td>
<td>Social norm theories</td>
<td>Social skills</td>
</tr>
<tr>
<td></td>
<td>Attitude theories</td>
<td>Conformity theories</td>
<td>Self-regulation/control</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Self-efficacy (Bandura)</td>
</tr>
</tbody>
</table>

effects on behavior, and would include self-efficacy, peer norms, and societal attitudes. Distal causes have indirect effects on behavior, and thus their effects on behavior “work through” (are mediated by) another, more proximal, factor. Some variables such as self-esteem, social learning, or cultural identity are proximal factors and their effects on behavior would be mediated through other variables. The TTI implies that public health efforts could theoretically target the three types of factors and position an intervention at one or multiple streams of influence.

Structural Model of Health Behavior

The Structural Model of Behavior (Cohen et al., 2000) emphasizes environmental influences of behavior. Four categories of environmental factors are viewed as critical in shaping health behaviors: (1) availability/accessibility, (2) physical structures, (3) social structures and policy, and (4) media and cultural influences.

Availability/accessibility

Behavior is influenced by access: the greater the access, the more likely the behavior is to occur. This principle is well-illustrated by a series of studies focused on the number of stores that sell alcoholic beverages in a given community. Neighborhoods with greater density (number per square mile) of alcohol sales outlets had higher rates of alcohol-related problems, such as motor vehicle accidents (Scribner, MacKinnon, & Dweyer, 1994), interpersonal violence (Scribner, MacKinnon, & Dweyer, 1995), and gonorrhea (Scribner, Cohen, & Farley, 1998). The Structural Model of Behavior suggests that implementing policies that reduce the density of alcohol outlets or even fast-food outlets would improve related health behaviors and health outcomes. Similarly, it has been demonstrated that the distribution of free condoms can lead to an increase in condom use (Cohen et al., 1999).

Physically limiting the product is one way to affect its availability; however, availability can also be achieved through modifying the price of the product. The concept of price elasticity suggests that people will buy less of a product as the price goes up and more as the price goes down. Studies have demonstrated that price hikes for cigarettes due to tax increases translate into reduced consumption as a result of restricted access (Flewelling et al., 1992; Ross & Chaloupka, 2003). Evidence suggests that this same effect also applies to alcohol consumption (Leung & Phelps, 1993). These two examples provide evidence that government policy changes, such as increasing taxes on tobacco and alcohol, can have a tremendous health-protective effect at the population level.

Physical structures

The physical environment can influence a range of health behaviors and health-related outcomes such as substance use, diet, physical activity, and unintentional injury. A classic example is the Children Can’t Fly program, developed in New York City (the Bronx) in response to the
high rate of childhood injuries due to falls from low-income high-rise structures. Many local 
apartment buildings had windows with wide openings rather low to the floor, and all too often 
children fell through these openings. Ultimately, the community provided inexpensive window 
guards to 42,000 families, leading to a dramatic reduction in childhood falls and injuries 
(Spiegel & Lindaman, 1977). 

Similarly, the fluoridation of water, fortification of salt with iodine, and convenient and safe 
pedestrian and bicycle routes are examples of effective environmental solutions to important health 
problems. Another example is creating defensible space to reduce neighborhood crime and drug 
dealing. A program known as Crime Prevention Through Environmental Design is credited with 
reducing crime by helping communities eliminate unsupervised and poorly lit spaces in urbanized 
areas by creating community gardens and the like (Newman, 1996). In this example, changes were 
made only to the built environment and were successful in achieving significant behavior changes. 

Social structures 
“Rules and organizations behind them are the social structures that mold the world we live in. In 
more ways than we realize, rules and organizations create an invisible structure that profoundly 
shapes how we live our lives and how healthy we are” (Farley & Cohen, 2005, p. 96). A striking 
example of the importance of social structures is the relationship between state seat belt laws and 
the actual use of seat belts. The national average for seat belt use was less than 40% until the fed-
eral government made highway funding contingent upon states’ adopting mandatory safety belt 
laws in the 1980s; this quickly resulted in an increase in use rates approaching 60%. States with 
primary enforcement laws that enabled police to ticket nonusers had higher rates of use than 
states with secondary enforcement laws. States in which enforcement of these laws was vigorous 
had still higher rates of use. Tobacco policies have shown similar success. States and communities 
that adopt policies that forbid smoking in public places report lower overall rates of smoking. 

Effects of media 
Media (Internet, movies, music, television, print, video games, etc.) have a profound influence 
on health behavior. Advertising is often used to shape social norms about the acceptability and 
attractiveness of engaging in certain health-related behaviors such as smoking, drinking alcohol, 
risky sexual behavior, high-sugar soft drinks, and high-fat diets. These negative influences are 
due primarily to the ubiquitous nature of media messages and partly to the ingenious use of 
communication theories in crafting those messages.

Behavioral Ecological Model 
The behavioral ecological model (BEM) (Hovell et al., 2009) focuses on the effect of metacontingencies, 
extending the concept of operant conditioning to the societal level. Operant conditioning, which is a 
cornerstone of behaviorism, was postulated by B. F. Skinner to explain how people learn new behaviors. Operant conditioning involves a process of reinforcement through consequences or contingencies. New behaviors are acquired as a result of
being either positively or negatively reinforced via contingencies in the environment (see Chapter 8). Borrowing heavily from operant conditioning, Hovell and colleagues defined metacontingencies as social reinforcements that transcend the individual to affect large segments of a population or subpopulation.

The strength of a metacontingency can be defined by the probability of encountering social consequences. Hovell and colleagues also argued that societal patterns and norms are operant, in that they provide general reinforcement for certain types of behavior, and thereby they shape the context within which behavior operates. The aggregate outcomes of cultural influences on behavior are described as metacontingencies because they have generalized effects on behavior. Metacontingencies may include general cultural patterns and standards, public policy, taxes, and regulations. For example, in California, there are strong and dense (i.e., pervasive) metacontingencies against smoking in public places due to the strict antismoking laws and policies, as well as a strong social norm that frowns upon smoking (see Figure 11-3). Given this reality, the probability of coming into contact with these metacontingencies would be high (e.g., there is no smoking allowed in restaurants or bars).

Traffic regulation techniques provide a familiar example of the effect of metacontingencies on behavior. Traffic lights can be programmed so that those who drive according to the posted speed limit will not have to stop often. The effect of this metacontingency is to reinforce safe speed limits and also reduce pollution. Similarly, many communities have installed cameras with lasers that detect and retain photographs of speeding vehicles, resulting in tickets mailed to the registered vehicle owner. These metacontingencies have been demonstrated to reduce speeding and may serve to shift social norms toward lower speeds, even in areas without cameras and timed traffic lights. Of course, these public safety measures can only be adopted in communities where the public and policymakers share social norms favoring these safety devices over the minor infringement on civil liberties involved.

**Structural Interventions: A Derivative of Ecological Approaches**

One aspect of ecological thinking is that the environment provides important influences on health and behavior. As stated previously, some environments set the stage for individuals to engage in risky behavior, and in addition to individuals, entire communities can also be thought of as being at risk. **Box 11-1** provides an excellent example of this concept by contrasting the healthiest city in the United States with the least healthy city. This contrast between the two cities illustrates how environments facilitate health-protective behavior (Burlington, VT) or health-compromising behavior (Huntington, WV). This “tale of two cities” provides support for the importance of understanding how the environment shapes and influences health behavior, and ultimately population health.

When any given part of the environment becomes a target for change, it is known as structural intervention. Structural interventions have become increasingly popular and can be subsumed under an ecological approach. In essence, the logic behind structural interventions is that the physical, legal,
economic, and regulatory structures within an individual's environment can be altered to support the adoption and maintenance of health-protective behaviors. One example of a structural intervention is providing supportive housing for homeless and unstably housed persons living with HIV/AIDS. The rationale is that by providing a stable home environment, people living with HIV/AIDS will engage in fewer risk behaviors, reducing the transmission of HIV (Kidder, Wolitski, Campsmith, & Nakamura, 2007).

**Microenvironmental and Macroenvironments**

Another way of conceptualizing ecological approaches is captured by the concepts of micro-environments and macroenvironments, articulated by Swinburn and Egger (2002). Similar to...
Bronfenbrenner’s microsystem, microenvironments include social and physical factors that are proximal and persistent. These include social influence by peers, parents, and family, as well as immediate resources such as money, equipment, and facilities. Macroenvironments (also similar to Bronfenbrenner’s macrosystem) include factors somewhat more distal than micro-environmental factors, affecting health and behavior in an indirect way by creating what Hovell would call metacontingencies. Macroenvironmental influences include policies, regulations, taxes, and resource allocation.

The availability of fresh foods in the home would be a microenvironmental factor, whereas the number of fast-food outlets in a community would be a macroenvironmental factor. The concept of micro- and macroenvironmental influences on behavior has been used to explain health behaviors of various sorts, including those that lead to obesity. Accordingly, modern U.S. society provides an obesogenic environment, which is thought to contribute to the epidemic of childhood and adult obesity (Swinburn & Egger, 2002).

To illustrate these micro- and macroenvironmental influences on behavior, consider this fictitious example of Tommy. To assist with this example, we provide a side-by-side comparison of these influences in Table 11-3.

**Box 11-1 How Important Is “Place”: The Tale of Two Cities**

In 2009, based on data from the Centers for Disease Control and Prevention (CDC), ABC News aired a segment on Nightline that contrasted Burlington, Vermont, to Huntington, West Virginia, with respect to health indicators such as cardiovascular disease, obesity, diabetes, and oral health. Burlington was ranked the healthiest city in America on these indicators, whereas Huntington was ranked the least healthy. Their news story, however, is actually less about the CDC ranking than the reasons for the great disparity between the two towns, each located on the east coast. One stark difference in lifestyle was extremely interesting: the people in Burlington engaged in regular and vigorous outdoor exercising despite the extreme cold, whereas the people to the south in Huntington were quite unlikely to engage in outdoor exercise. This point alone raises the question of the extent to which the differences are due to the structural environment or culture of the environment. Suggesting that the environment may indeed be the key, the news story noted that the large lake serving the Burlington residents was designed for recreation (bike and walking trails, swimming, etc.), while the lake serving Huntington residents was unlikely to be used for recreational purposes. The “built environment” characterizing the Vermont lake may indeed explain much of the difference between the towns’ rates of obesity, heart disease, and diabetes. Of course, one could argue that, ultimately, culture is the reason why the built environments came about; people wanted to have outdoor recreation areas, so they set aside resources to build the trails, etc. The reverse argument, however, may indeed be more appealing, simply because it suggests that some effective health promotion programs may begin with a construction project. This type of thinking is quite consistent with the concept of built environments, implying that people will use a jogging track or bike trail when available and convenient. In essence, the thinking is that cultural practices such as not engaging in outdoor aerobic exercise in the winter may be amenable to change simply by creating a public environment that supports and encourages this activity. Clearly, the first substantial step is to build the track or bike trail!

The story on ABC News also contrasted the eating habits of the two cities. Burlington residents eat more whole foods (fresh vegetables, meats, etc.) and Huntington residents eat more pre-prepared, processed, and high-fat fast-foods. Again, the question of culture versus the environment applies and, again, the intriguing answer is that cultural habits regarding food may change given the easy availability of whole foods. However, it is unfortunately true that people may not be able or willing to spend the greater amount of money required to buy the whole foods that people such as residents of Burlington, Vermont, seem to consider standard fare.
Tommy is a typical 10-year-old boy attending elementary school in a suburban neighborhood of the midwestern United States. Tommy's parents each work full-time jobs. Each morning for breakfast Tommy quickly consumes sugary breakfast cereals that he has asked his parents to buy for him. Not surprisingly, Tommy favors cereals advertised on television, designed to appeal to children like Tommy, while his parents give in to his desires because these types of cereals are often cheaper. Although Tommy lives fairly close to school, most days he gets a ride from one of his parents, who are uncomfortable letting him walk or ride his bike to school due to the lack of sidewalks. Tommy is not athletic and during physical education classes he generally stays on the sidelines with other overweight children to avoid being made fun of by other students or the teacher. At lunchtime, Tommy often consumes a cheeseburger, fries, and chocolate milk. Sometimes he takes an apple, but after eating his favorite things he usually has no appetite for the apple. After school, Tommy has a sugary toaster treat, a dessert left over from the previous evening, or some other high-fat snack. Rather than play outside, Tommy watches TV or plays video games until dinner. He would like to play outside with friends in his neighborhood, but there are no parks or other open spaces and his parents do not want him to play in the street. After dinner and dessert, Tommy does his homework, has another snack while he watches TV, and then goes to bed.

Tommy is overweight in part because of his obesogenic environment; however, he is not alone. According to the Ogden and Carroll (2010), between 1988–1994 and 2007–2008 the prevalence of obesity increased from 11.6% to 16.7% among non-Hispanic white boys, from

<table>
<thead>
<tr>
<th>Microenvironmental Influences</th>
<th>Macroenvironmental Influences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parents allow or encourage a high-fat diet, provide few alternatives to high-fat food, and do not encourage physical activity</td>
<td>Sidewalks not provided so walking to school not safe</td>
</tr>
<tr>
<td>Affiliation with other overweight peers may affect self-perception and norms</td>
<td>Local community priorities favor roads over recreational areas and programs</td>
</tr>
<tr>
<td>School lunch provides high-fat diet, contributing to weight and norms</td>
<td>National agricultural policies funnel high-fat, commodity foods to school food services</td>
</tr>
<tr>
<td>School physical education fails to engage Tommy and other overweight children, wasting the opportunity for exercise and calorie expenditure and encouraging the sedentary norms</td>
<td>Federal policies fail to regulate advertising on children’s programs</td>
</tr>
<tr>
<td>Lack of local green spaces, parks, and recreation facilities reduce opportunities for physical activity</td>
<td>Regulation of food industry fails to emphasize healthful diet</td>
</tr>
<tr>
<td>Lack of organized community sports and recreation activities minimizes opportunities for physical activity</td>
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<tr>
<td>School district policies do not favor healthful school environment, providing high-fat meals and physical education that does not adequately support fitness goal</td>
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10.7% to 19.8% among non-Hispanic black boys, and from 14.1% to 26.8% among Mexican-American boys (see Figure 11-4).

Tommy’s food intake is influenced by the food industry and the school lunch program, which both promote and provide high-fat and high-calorie foods. Tommy’s parents are also influenced by the food industry and are not able or are not willing to provide Tommy with a well-balanced diet. The lack of sidewalks and convenient outdoor recreation areas reduces opportunities for physical activity. The availability of electronic games, television, and Internet compete with more physical activities. Given his diet and lack of regular physical activity, Tommy will continue to gain weight; by the time he reaches high school he may be obese, and this condition is unlikely to be reversed in his adulthood. Tommy’s parents are well-intentioned, but are also susceptible to the same environmental influences as Tommy. They tend to buy and serve foods that are advertised and have a rather sedentary lifestyle, thereby encouraging Tommy’s obesity unwittingly. Consider the environmental influences on Tommy’s diet and physical activity behavior.

Is Tommy’s behavior the product of individual choice or environmental influence? The answer, of course, is that individual choice and environmental influence are highly interrelated. Tommy’s behavior can be understood as the product of micro- and macroenvironmental factors that generally encourage his high-fat, high-calorie diet and infrequent physical activity. However, not all children exposed to the same environmental influences become obese, so clearly there is an interaction.
between the individual and the environment. There is also little question that the environment influences behavior. Therefore, it makes sense to create healthful environments as often as possible. While thoughtful school curricula designed to teach Tommy the importance of skills for eating healthy foods may influence Tommy’s motivation to eat fewer calories, without concomitant environmental support, Tommy’s behavior is unlikely to change. After all, dietary behavior is influenced by the access to foods, advertising, the density of fast-food outlets, and other environmental factors. Changing these in ways that support healthful eating are important and necessary influences on motivation and behavior.

One of the important implications of ecological thinking is that change strategies should create environments that facilitate healthy behavior. One way of thinking about this is to create, when possible, environments where the healthful “choice” is the default option. Loewenstein, Brennan, and Volpp (2007) described this concept as asymmetric paternalism, where micro- and macroenvironments are engineered to promote the adoption of health-protective behaviors, especially for those less prone to adopt them, while also not harming those who already engage in them. Simply stated, the paternalism aspect means granting access to the healthy choice while inhibiting access to the unhealthy choice. The goal is to make it easy to do the “right” thing and more difficult to do the “wrong” thing. What if, for example, general practitioners routinely scheduled a colonoscopy for their patients turning 50 years of age (the age of first recommended colonoscopy)? What if fast-food restaurants replaced the soda in their value meals with bottled water? The same concept can be applied to myriad behaviors, including dietary choices and exercise. For example, school food services and even restaurants could highlight low-fat, low-sodium foods and deemphasize highly processed, high-fat foods. Stairs could be located centrally and elevators off to the side of new buildings. Roads could be planned so that pedestrian and bicycle routes were safely integrated rather than added on later. The density of fast-food restaurants and alcohol outlets could be greatly limited through zoning regulation. Of course, these kinds of changes are not going to happen overnight or by chance, but there are ways of making incremental changes.

**Applied Examples**

Here we provide several examples of structural and multilevel approaches applied to a variety of health behaviors. These examples serve to illustrate the fundamental principle that small structural changes can influence large numbers of people.

**Example 1: New Zealand French Fries**

Morley-John, Swinburn, Metcalf, Raza, and Wright (2002) provided a fascinating study that serves as an excellent illustration of this principle. In a study in New Zealand, they found that the fat content of restaurant-prepared french fries varied from as little as 5% of the weight to as
much as 20%. This variation is attributable to frying practices and the thickness of the french fry. Thinking from an ecological intervention perspective, it would be quite easy to imagine that requiring all fast-food restaurants to use thicker fries (Swinburn & Egger, 2002) would result in fat content being reduced to the lower end of the range. This small change in one practice, when magnified through large chains such as McDonalds and Burger King, could indeed have profound and lasting impacts on the mean level of daily fat intake across extremely vast populations worldwide. In turn, the net effects of this lowered mean daily intake could become part of a larger mosaic effort to engineer clinically meaningful reductions in obesity. Clearly, similar small effects magnified to meaningful levels could be achieved by mandating and enforcing frying practices that limit the absorption of fat into the potato slices.

**Example 2: Smoking Control Policies and Practices**

An excellent example of the power of policy is found in the adoption and enforcement of laws that prohibit the sale of tobacco to minors. More strict and comprehensive smoking policies are associated with lower rates of smoking among adolescents (Botello-Harbaum et al., 2008). An analysis found a strong relationship between merchant compliance with laws prohibiting sales to minors and the use of tobacco among minors. For every 1% increase in merchant compliance, there was a 2% decline in tobacco use among young people (DiFranza, Savageau, & Fletcher, 2009).

A widely publicized example of a program guided by the goal of modifying behavior through changes in policy and related metacontingencies is the California Tobacco Control Program. The overall objective of the program was to transform the public image of tobacco use, making it a socially unacceptable behavior. One program emphasis focused on passing laws to discourage smoking, including banning smoking in public places (environmental tobacco smoke laws). Such laws not only limit opportunities for smoking and make smoking inconvenient, but also contribute to a social climate supportive of nonsmoking behavior. Ultimately, many policies were adopted to restrict sales to minors, limit tobacco product advertising, and increase the cost of cigarettes via tax levies. Some of the funds generated by these taxes were used to support smoking cessation programs for pregnant women and to provide tobacco use prevention programs to school children. In addition, the overall program provided support for smoking prevention media and school-based programs. The expansive program emphasis on the metacontingencies of smoking policies and social norms was credited with altering societal reinforcement for smoking, thereby reducing overall smoking rates (Hovell et al., 2002).

**Example 3: Encouraging Stair Use**

Another example of the effects of a small structural change on behavior is the simple posting of signs on stairs and elevators to encourage greater use of the stairs (Russell, Dzewaltowski, & Ryan, 1999; Brownell, Stunkard, & Albaum, 1980). Of course, stairs that are attractive and accessible are more likely to be used, but beyond this, education and media may also foster social norms favoring stair walking and other physical activity. This is one successful example of simple structural changes that encourage healthful behavior and can be implemented in conjunction with health promotion campaigns designed to motivate these behaviors.
Example 4: HIV Prevention in Brazil

An example of an ecological intervention is the remarkable success of the government of Brazil in the prevention of HIV and in the long-term control of AIDS. In the early 1990s, the AIDS epidemic in Brazil was not much different than the AIDS epidemic in most African countries. By the year 2000, AIDS incidence in Brazil had leveled off to about 25,000 cases per year (Okie, 2006), less than one-half the rate reported by the United States for 2006. In the short time between 1996 and 2002, Brazil achieved a 50% reduction in AIDS-related mortality and an 80% decline in AIDS-related hospitalization (Anonymous, 2005). The vast majority of this public health success story is a direct consequence of changes to the macroenvironment leading to changes in social norms.

Potentially the most significant macroenvironment change occurred in conjunction with Brazil’s adoption of a constitutional right to universal access to health care in 1988. Brazil pioneered the world’s first government-sponsored program that provided free access to antiretroviral therapy for all its citizens with HIV/AIDS. Clearly, this bold move also involved a huge financial investment by the government; however, it appears that the investment was wise, Brazil is estimated to have saved approximately $2.2 billion between 1996 and 2004 (Okie, 2006). Brazil effectively reduced costs in this venture by working with manufacturers to make available low-cost generic versions of antiretroviral medications. Arguably as important as the economics of this plan has been the commitment to comprehensive public education programs to prevent HIV infections. Brazil’s national AIDS program has aggressively pursued the agenda of preventing HIV infections. Brazil’s national AIDS program has aggressively pursued the agenda of preventing HIV infections. Brazil’s national AIDS program has aggressively pursued the agenda of preventing HIV infections. Brazil’s national AIDS program has aggressively pursued the agenda of preventing HIV infections. Brazil’s national AIDS program has aggressively pursued the agenda of preventing HIV infections. Brazil’s national AIDS program has aggressively pursued the agenda of preventing HIV infections.

The model efforts of Brazil exist in stark contrast to the lack of government support for condom promotion and sex education in the United States. Brazil has been credited with great success in promoting condom use among commercial sex workers, a population that is blatantly ignored and marginalized in the United States. The same is true for injection drug users, as the Brazilian government has supported effective needle and syringe exchange programs, while similar efforts in the United States have largely languished. With just these few examples in mind, it is quite clear that a truly effective ecological approach is highly dependent on active government support and sponsorship because public health is ultimately a function of social norms, which both influence and are influenced by government programs and policies. Notably, one of the greatest achievements of the National AIDS Program in Brazil is the nationwide destigmatization of AIDS. By the free provision of antiretrovirals, people were far less reluctant to be tested for HIV and to “come out” with their HIV-positive status, given the lifesaving advantages of treatment. In essence, this single change to the macroenvironment created a social norm that fostered a national attitude of compassion and caring rather than marginalization and discrimination. AIDS is not disappearing in Brazil, but it is safe to assert that their epidemic is under a level of control that is simply not possible in the absence of the broad-sweeping ecological changes made in that country.

Ultimately, the goal of this chapter has been to provide you with new ways of thinking about health behavior. Collectively, ecological approaches emphasize environmental influences on health behavior and suggest the importance of multilevel programming. Even though attempting
to change environmental factors may be a daunting challenge, the returns to public health may be substantial. Although it is not always possible to alter macroenvironmental influences such as public policies, it is usually possible and useful to target interventions to microenvironmental factors, such as local social and physical environmental factors.

**Take Home Messages**

- Ecological approaches may be most applicable and effective with health behaviors that permeate daily living, such as eating and exercise behaviors, but environment and individual factors interact with respect to all health behaviors.
- We do not suggest in this chapter that health promotion should focus exclusively on structural-level changes. We do, however, suggest that the structural environment influences behavior and that health promotion planning should always consider including structural-level intervention when feasible.
- Ecological and structural approaches provide additional perspectives that may be useful in constructing a “theory of the problem” (see Chapter 1) and suggest a variety of micro- and macroenvironmental goals worth including as part of multilevel programming.
- Multiple examples exist to support the idea that simple structural changes in the environment can have lasting and profound effects on the behaviors that greatly influence the onset of chronic diseases, including diabetes, heart disease, and cancers, as well as infectious diseases such as AIDS.
- The processes of behavior change are the same whether the behavior is personal (e.g., one’s diet, physical activity, or substance use), supportive (e.g., parents provide opportunities for healthful diet and physical activity), structural (e.g., schools and communities provide healthful environments with open spaces for exercise and play and safe areas for walking and biking), or public policy (e.g., taxes on cigarettes and smoke-free public places). The key is to identify who controls or influences these goals or outcomes and then create interventions to alter their behavior.

**References**


