CHAPTER ONE

OVERVIEW OF INTERVENTION MAPPING

Reader Objectives

- Explain the rationale for a systematic approach to intervention development
- Describe an ecological approach to intervention development
- Explain the types of logic models that can be used to conceptualize various phases of program development
- List the steps, processes, and products of Intervention Mapping

In this chapter we present the perspective from which Intervention Mapping was conceived as well as its purpose. We also present a preview of the program-planning framework, which is detailed in the remaining chapters.

The purpose of Intervention Mapping is to provide health promotion program planners with a framework for effective decision making at each step in intervention planning, implementation, and evaluation. Health promotion has been defined as "Any combination of education, political, regulatory and organizational supports for actions and conditions of living conducive to the health of individuals, groups or communities" (Green & Kreuter, 2005, p. G-4), and health education is a subset of health promotion strategies that are primarily based on education. We recognize this distinction but also the fact that many people in the health field practice health promotion; some of them specialize in health education. Often the boundaries are

quite blurred. This book uses the terms *health educator, health promoter,* and *program planner* interchangeably when a subject is needed to mean someone who is planning an intervention meant to produce health outcomes. An intervention can be designed to change environmental or behavioral factors related to health, but the most immediate impact of an intervention is usually on a set of well-defined determinants of behavior and environmental conditions.

A difficulty that planners may encounter is that of delineating tasks for the development of health promotion or education programs that are based on theory, empirical findings from the literature, and data collected from the at-risk population. Existing literature, appropriate theories, and additional research data are basic tools for any health educator; but often it is unclear how and where these tools should be used in program planning. In Intervention Mapping, these tools are systematically applied in the steps of program development.

Box 1.1. Mayor's Project

Imagine a health educator in a city health department. The city's mayor, who has recently received strong criticism for inattention to a number of critical health issues, has now announced that a local foundation has agreed to work with the city to provide funding to address health issues. Youth violence, adolescent smoking, and other substance abuse as well as the high incidence of HIV/AIDS are among the issues competing for the mayor's attention. Not only does the allocated sum of money represent a gross underestimation of what is needed to address these issues, but also the city council is strongly divided on which health issue should receive priority. Council members do agree, however, that to dilute effort among the different issues would be a questionable decision, likely resulting in little or no impact on any single issue. As a response to increasing pressures, the mayor makes a bold political move and presents a challenge to the interest groups lobbying for public assistance. The mayor agrees to help secure funds on a yearly basis, contingent on the designated planning group's demonstrating significant, measurable improvements in the issues at hand by the end of each fiscal year.

The head of the health promotion division of the city health department is a social psychologist. She intends to use the mayor's challenge as a testing ground for her favorite behavioral science theory, but she has appointed the health educator to lead the project. Although apprehensive about the professional challenge as well as the complications inherent in facilitating a highly visible political project, the health educator is encouraged by the prospect of working with community and public health leaders.

The first step the health educator takes is to put together the planning group for the project. She considers the stakeholders concerned with youth health in the city. These are individuals, groups, or other entities that can affect or be affected by a proposed project. She develops a list of community and public health leaders and invites these individuals to an initial meeting whose purpose is to expand this core group. She uses a "snowball" approach whereby each attendee suggests other community members who may be interested in this project. The superintendent of schools begins the process by suggesting interested parents, teachers, and administrators. Later these individuals may have additional suggestions. After the first meeting, the health educator has a list of 25 people to invite to join the planning group.

Twenty-five people is a lot of people for one group, and the health educator knows that this multifaceted group will have to develop a common vocabulary and understanding, work toward consensus to make decisions, maintain respect during conflicts, and involve additional people throughout the community in the process. Members must be engaged, create working groups, believe that the effort is a partnership and not an involuntary mandate, and work toward sustainability of the project (Cavanaugh & Cheney, 2002). The health educator knows that she has taken on a complex task, but she is energized by the possibilities.

The composition of the city's planning group is diverse, and group members are spurred by the mayor's challenge and enthusiastic to contribute their expertise. With this early momentum, the group devotes several weeks to a needs assessment, guided by the PRECEDE model (Green & Kreuter, 1999, 2005). The members consider the various quality-of-life issues relevant to each of the health problems, the segments of the population affected by each issue, associated environmental and behavioral risk factors for each health problem, and determinants of the risk factors.

Members recognize the relative importance of all three issues, but they select youth violence because violence is a particular problem in their community, which disproportionately affects underserved minorities. Also, they are challenged by the lack of effective or evaluated violence prevention programs in the field (Tolan & Guerra, 1994, 1996; World Health Organization, 2002; Centers for Disease Control & Oak Ridge Institute for Science and Education, 2003), and the interests and expertise of the individual group members are well suited to working on this problem. The results of the needs assessment indicate that violence is the leading cause of death among young people aged fifteen to twenty-four in the United States and the primary cause of death among Hispanics and African Americans in this age group (Singh & Yu, 1996). Moreover, for every violent death, conservative estimates suggest that 100 nonfatal injuries result from violence (Rennison, Rand, & U.S. Department of Justice, 2003). The group

reviews the literature to identify the behavioral and environmental causes of violence and finds that the factors related to violence are diverse.

For example, socioeconomic status, education, and job mobility are all factors that may be related to personal involvement in violence. The lack of conflict resolution and communication skills are enabling factors related to personal violence. At the same time, the sudden occurrence of situational antagonism, such as verbal or physical assault, is a contextual factor that is also likely to incite violent behavior (Reiss, Miczek, & Roth, 1993). The planning group reviews a long list of factors related to violence. They recognize that their one-year program can address certain of these. However, they also realize that broad social problems such as poverty and lack of opportunities for success in school and employment must be taken into account even though they are not easy to address. Further investigation reveals that little empirical evidence is available on the effectiveness of existing programs that address a broad array of determinants of violent behavior (Tolan & Guerra, 1994).

Even though the planning group comprises many segments of the city's leadership, health sector, and neighborhoods, the members realize that they do not have a deep enough perspective on youth violence in their community. A subgroup takes on the role of community liaison to meet with members of various communities within the city that have been disproportionately affected by violence. The community liaison group wants to understand community members' perceptions of their needs, but it is equally concerned with understanding the strengths of the communities and their unique potential contributions to a partnership to prevent violence. The subgroup invites members of each interested neighborhood to join the planning group. Jointly, the planning group, the communities, and the funders agree to select this problem as the focus of a health education and promotion intervention.

The group's work on the needs assessment facilitated group cohesion and cultivated even greater enthusiasm about generating a solution for the health problem. Several members of the group even began to imagine the victory that would be had if the group were to produce a change in half the allotted time because so much of the needed background information had already been gathered. The health educator remains apprehensive about the time frame yet comfortable with the group's pace and productivity. Now that the group has decided which issue to address, it faces the challenge of moving to the program-planning phase. In her previous work the health educator had implemented and evaluated programs designed by others, but she had not created new programs. However, bolstered by its good work, the group schedules the first program-planning meeting.

What the health educator hadn't anticipated was that in the course of conducting the needs assessment, each group member had independently begun

to conceive of the next step in the planning process as well as to visualize the kind of intervention that would be most suitable to address the problem. The day of the meeting arrived, and on the agenda was a discussion of how the group should begin program planning. What follows is a snapshot of dialogue from the planning group that illustrates several differing perspectives.

Participant A: As we see from the needs assessment, violence is a community problem. According to community development techniques, we have to start where the people are. I think we should begin by conducting a series of focus groups and have the kids tell us what to do.

Participant B: But why do you use the kids to develop a program for the community? I say we address violence at the family level, using a series of conflict resolution training workshops for kids and their parents.

Participant C: Community and family are only two dimensions of the problem. The literature says you have to address multiple levels in a comprehensive approach. Plus, onetime workshops have no long-term impact. I say we find a nonprofit group to serve as a community coordinating center from which various interventions and services can be implemented. That way, programs are sustainable, and a variety of activities can be offered.

Participant D: One of the national violence prevention centers has great brochures and videos—in three languages. We have numerous testimonials from kids, teachers, and parents about how motivated they were by these interventions. This approach is quick and easy; it's low cost; and I've already made sure we can get the materials. Plus, if the materials come from a national center, they must be effective.

Participant B: But are those materials really powerful enough? How would you address the different levels of the community? Moreover, violence is a human problem. The root of the problem is that kids don't have anyone or anything they can relate to. In school we always started with learning objectives that reflect the needs of the specific patient population.

Participant E: Yes, but we know it takes more than learning information to change behavior. We have to address factors such as attitudes and self-efficacy. But how do we measure a change in attitudes? I think we should measure behavior directly.

Participant F: Well, clearly we have to begin by designing a curriculum. What are our learning objectives?

The health educator in our example must first consider what steps to follow to construct the intervention and then must consider how to design each step to incorporate the needs, ideas, training, and experience of the various members of the planning group. The planning group began well by completing a comprehensive needs assessment using an effective model that has been applied to many health issues (Green & Kreuter, 2005). The members began the program-planning phase armed with an ecological perspective, that is, the belief that one must intervene at individual, organizational, community, and societal levels to resolve a problem (McLeroy, Bibeau, Steckler, & Glanz, 1988; Simons-Morton, Greene, & Gottlieb, 1995; Kreuter, De Rosa, Howze, & Baldwin, 2004). But, as the group dialogue indicates, each group member brought a different set of experiences and training to the meeting. This is a common experience in group activities. Although group members may become critical of other perspectives, each member makes an important and relevant contribution worthy of consideration in the creation of the intervention.

Perspectives

Intervention Mapping is based on the importance of planning programs that are based on theory and evidence. We also take into consideration the social and physical environmental causes of health problems and risk behavior.

Theory and Evidence

We agree with Kurt Lewin's adage that nothing is as useful as a good theory (Hochbaum, Sorenson, & Lorig, 1992). We believe this is especially important in health promotion planning. The use of theory is necessary in evidence-informed health promotion to ensure that we can describe the aspects of programs that are generalizable and robust interventions that actually address all of the determinants necessary to achieve change. In general, the use of theory can help us protect against type III error, that is, failing to find intervention effectiveness because the program is poorly designed or implemented (Green, 2000). Still, given this assertion, more guidance is needed regarding the application of theory in health promotion and health education practice. Few teachers of health promotion would debate the importance of teaching behavioral and social science theories, but many observers would question whether teachers use effective methods to teach students to *use* theory (McLeroy et al., 1993). Some authors argue that many practitioners find theory nearly irrelevant to their practices (Hochbaum et al., 1992; Jones & Donovan, 2004).

Furthermore, program planners, even those who are scientists, often approach theory in a way that is fundamentally different from either the theory generation or the single theory–testing process. Health promotion planners are likely to bring multiple theoretical and experiential perspectives to a problem rather than to define a practice or research agenda around a specific theoretical approach. Teachers of health promotion and education suggest that the field will be well served with better guidance in how to use theory to understand health and social problems (Burdine & McLeroy, 1992; DiClemente, Crosby, & Kelger, 2002; Earp & Ennett, 1991; Glanz, Lewis, & Rimer, 1997; Glanz, Lewis, & Rimer, 2002; Hochbaum et al., 1992; Kok, Schaalma, de Vries, Parcel, & Paulussen, 1996; Jones & Donovan, 2004).

To understand a problem, the planner begins with a question about a specific health or social issue (Veen, 1985; Kok et al., 1996). The planner then accesses social and behavioral science theories and research evidence of causation at multiple levels. These or other theories may also suggest intervention points and methods, and the planner proceeds to accumulate evidence for the effectiveness of these methods. By the term *evidence,* we mean not only data from research studies as represented in the scientific literature but also opinion and experience of community members and planners. In this way theoretical and empirical evidence are brought to bear on meeting a health or social need. Intervention Mapping provides a detailed framework for this process.

An Ecological Approach to Health Promotion Program Planning

The World Health Organization (WHO) defines health as an instrumental value in service of a full, gratifying life (WHO, 1978, 1986). We recognize the interaction of health and quality of life, and Robertson and Minkler (1994) point out the existence of both a micro level or individual dimension to health and a macro level structural dimension. Our primary focus, consonant with health education and health promotion, is that of health as it is mediated by both behavior and environment (Parcel et al., 1987). In Intervention Mapping we argue for a social ecological approach in which health is viewed as a function of individuals and of the environments in which individuals live, including family, social networks, organizations, communities, and societies (Stokols, 1996; Berkman & Kawachi, 2000; Marmot, 2000). Individual behavior is influenced by determinants at these various environmental levels. The social ecological paradigm focuses on the interrelationships among individuals with their biological, psychological, and behavioral characteristics and their environments. These environments include physical, social, and cultural aspects that exist across the individual's life domains and social settings. A nested structure of environments allows for multiple

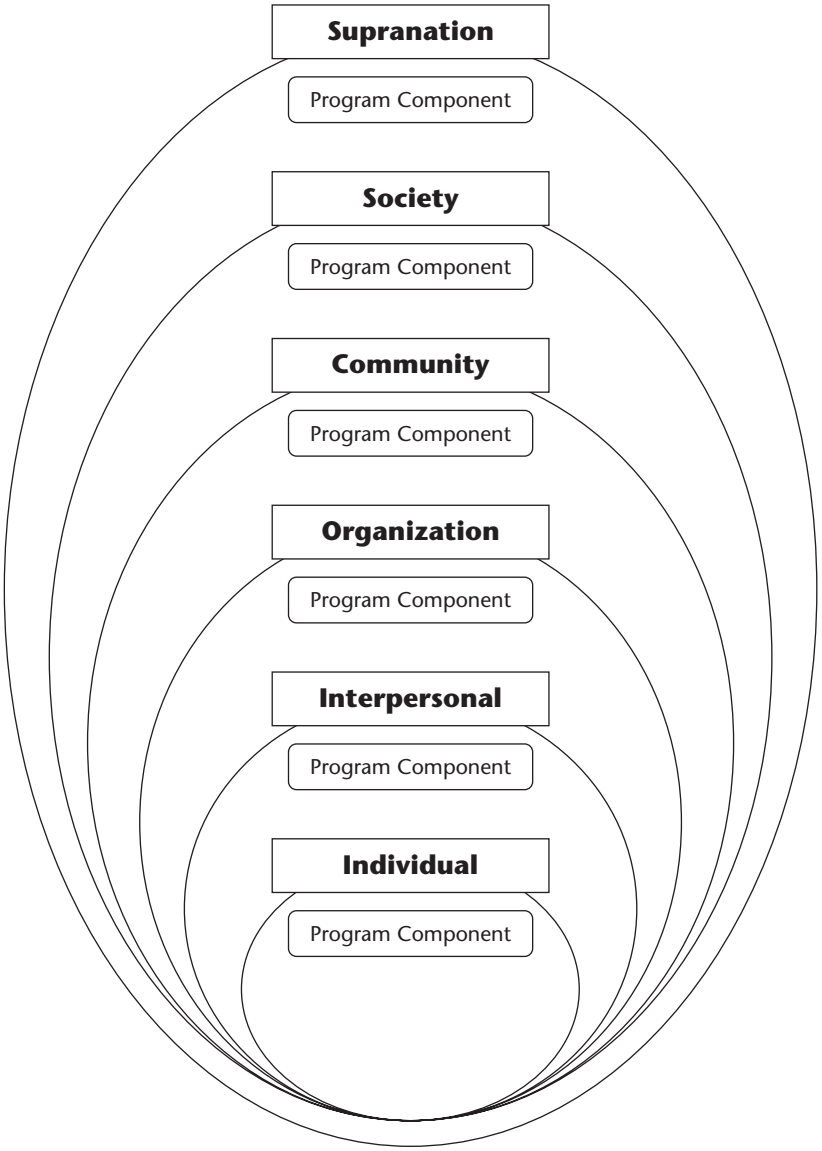
influences both vertically across levels and horizontally within levels. The picture that emerges is a complex web of causation as well as a rich context for intervention. Looking for the most effective leverage points within this web, across levels, reduces the complexity and is necessary for developing effective multilevel interventions.

Planners can look at the relationship between individuals and their environments in two ways. First, mechanistically, the individual and the environment can be viewed as mechanisms in a general system in which small changes in the social environment, for example, can lead to large changes in individual behavior (Green, L. W., personal communication, February 26, 1997). This view tends toward an emphasis on higher-order intervention leverage points such as policy or social norms as external determinants of the individual's behavior, health, and quality of life. Second, the various levels are viewed as embedded systems. In Figure 1.1, higher-order systems set constraints and provide inputs to lower-order systems, and the lower-order systems provide inputs to systems at a higher level. New properties emerge at each system level, but each level incorporates the lower levels of embedded systems. For example, social norms exist independently of the individual even though the individual perceives them. An intervention may influence both levels (that is, the actual norms and the individual perception), and these may in turn influence both health behavior and health.

Multiple levels may be influenced by an intervention at one level. For example, a program aimed at convincing organizations to conduct health-related lobbying may influence a legislature to pass laws that may influence individual health behavior. For example, one of our colleagues worked with a coalition in a large metropolitan area to use media and social advocacy to influence the police department and the U.S. Department of Labor to crack down on the use of young Hispanic children as dancers in bars and nightclubs (an activity that can lead to health risk behaviors of substance abuse and prostitution). In this example, intervention at the individual or interpersonal levels would have been difficult. Families felt helpless to control the girls' activities, and the monetary incentives to dance were strong in impoverished neighborhoods. However, once social change began to occur, parents expressed more empowerment to manage their children.

A program may be aimed at any ecological level and have effects on that level and all the levels nested within it. For example, individuals may not engage in physical activity due to determinants at each level: personal lack of self-efficacy for exercise, lack of social support from family and friends at the interpersonal level, lack of fitness norms and facilities at the work site or organizational level, and barriers to physical activity in the built environment at the societal level. Figure 1.1 denotes embedded reciprocal systems with individual, group, organization, community,

FIGURE 1.1. SCHEMATIC OF THE ECOLOGICAL APPROACH IN HEALTH PROMOTION PROGRAMS.



Source: Adapted from Potvin, Kishchuk, Prlic, & Green, 1996.

society, and supranational levels. This figure indicates that the individual exists within groups, which in turn are embedded within organizations and higher-order systems. The individual is influenced by these systems and can in turn influence them directly or through groups and organizations. We acknowledge the hazards of trying to plan from such a complex formulation, but we judge the hazards of oversimplicity to be greater. Nevertheless, we agree with Green that complexity can breed despair, and we encourage the reader to bear with the process (Green, Richard, & Potvin, 1996). Intervention Mapping helps the planner take on this complexity in a structured systematic way, thereby making it more manageable without oversimplifying.

Agency in the Environment

We draw the approach to change at the various ecological levels from three traditions. The first is that of Kurt Lewin, who focused on the gatekeepers within channels (McGrath, 1995). The second is social exchange theory, which focuses on the positions or roles of persons within the social system (Coleman, 1990). And the third is the MATCH model, which has been used to plan multilevel interventions for health education (Simons-Morton, Greene, & Gottlieb, 1995; Simons-Morton, Simons-Morton, Parcel, & Bunker, 1988).

In each of these views, the key to understanding social reality at each of the ecological levels and ways to change conditions at each level is tied to understanding the positions that compose the level and exert influence on its conditions. For example, Lewin described two channels by which food gets to a family's table: the grocery channel and the garden channel (McGrath, 1995). In the grocery channel, various gatekeepers act to influence what foods are selected to move along the channel, from the food manufacturer's product-line managers to the buyers at the wholesale grocer's, to the grocery chain buyers, to the individual store managers, to the shopper for the family. At each point an array of forces helps or hinders passage through the gates along the channel. The product-line manager, for example, acts on findings from consumer marketing surveys, cost and availability of ingredients, and fit to the company's manufacturing facilities. Consumer demand for low-fat products could influence the food manufacturer to produce these foods. Moving down the channel to the end of the line, the family shopper may be influenced by forces that include motivations to provide healthy food for the family, to please the family, to save money, and to purchase food that is easily prepared. By understanding the determinants of these gatekeeper behaviors at several levels, the health educator is better able to plan where to intervene to create the most effective and efficient interventions for change.

Throughout the book we have adopted the approach of Simons-Morton and colleagues (1988, 1989) of looking at agents (decision makers or role actors) at each systems level: interpersonal (for example, parents), organizational (for example, managers of school food services), community (for example, newspaper editors), or societal (for example, legislators). The focus of interventions at the various levels are agents (individuals or groups, such as boards or committees) in positions to exercise control over aspects of the environment.

The Need for a Framework for Intervention Development

When the authors of the often-used PRECEDE model (Green, Kreuter, Deeds, & Partridge, 1980) began development more than thirty years ago, they were concerned with the focus of the field of health education on intervention. Health education programs often did not have firm epidemiological foundations, and outcomes sometimes were not documented in terms of change in behavior, environment, health, or quality of life. Green, Kreuter, and colleagues (Green et al., 1980) intentionally steered away from a focus on intervention (Green, L. W., personal communication, February 26, 1997) and acknowledge the impact of other pioneers in the field such as Mayhew Derryberry, who cautioned against a focus on activities rather than outcomes. After thirty years of developments in the field, we believe that we can cautiously steer back toward an intervention focus.

We believe that everyone with a health education or health promotion role must have the knowledge and skills to develop effective interventions. Anyone with the responsibility to help individuals or communities change health risk behavior, initiate health-promoting behavior, change environmental factors, or manage illnesses must design or adapt existing effective interventions and develop plans to implement them. With the movement toward best practices and evidence-based public health (Green & Kreuter, 2002; Centers for Disease Control and Prevention & Oak Ridge Institute for Science and Education; 2003; Truman, Smith-Akin, Hinman, Gebbie, Brownson, Novick, et al., 2000; International Union for Health Promotion and Education & European Commission, 1999; Cameron, Joslin, Walker, McDermott, & Gough, 2001) and evidence-based public health following in the footsteps of evidence-based medicine (Zaza, Briss, & Harris, 2005; Task Force on Community Preventive Services, 2000, p. 5; Briss, Rodewald, et al., 2000; Briss, Zara, et al., 2000), some planners may think that they are superfluous, that their jobs are over. Nothing could be further from the truth.

First, there are certainly not enough well-evaluated and effective interventions to meet every, or even most, needs. The United States Task Force on Community

Preventive Services (Zaza, Lawrence, Mahan, Fullilove, Fleming, Isham, et al., 2000; Zaza et al., 2005; Guide to Community Preventive Services, 2004) systematically reviewed many interventions. In 50 percent of the interventions reviewed for the first edition of the Guide, however, there was insufficient evidence to make any recommendation; and planners may face a problem for which there is little intervention guidance.

Furthermore, although collections of interventions reviewed by the task force were grouped to be as similar as possible, in view of the diverse interventions tested in the original studies, program planners will still be faced with some need for planning exactly what to adapt and implement for their communities (Zaza et al., 2000; Zaza et al., 2005; Guide to Community Services, 2004) Some groupings in the Guide are helpful, as for example, the recommendation that client reminder (vaccination is due) or recall (vaccination is late) systems increase vaccination coverage among children and adults. The recommendation is the same regardless of the delivery method (telephone, postcard, or letter) or message (specific or general) (Briss, Rodewald, et al., 2000). In other cases, however, the grouping of interventions is less helpful. Another example from those aimed at increasing vaccination coverage is the recommendation for multi-component interventions that include education. To be sure, a note describes the frequency of component interventions in the multi-component interventions on which the recommendation was based, but these include client reminders, provider education, expansion of the hours of access, and so forth—a grouping with diverse components. Thus, the advent of such resources of evidence-based interventions will greatly facilitate the job of intervention development some of the time and merely assist more of the time.

Some best practices are actually planning processes as described by Freudenberg and colleagues (1995, pp. 297–299), who suggested that programs should do the following:

- Be tailored to specific populations and settings
- Involve participants in planning, implementation, and evaluation
- Integrate efforts aimed at changing individuals, social and physical environments, communities, and policies
- Link participants' concerns about health to broader life concerns and to a vision of a better society
- Use resources within the environment
- Build on the strengths of participants and communities
- Advocate for resources and policy changes needed to achieve the desired health objectives
- Prepare participants to become leaders

- Support the diffusion of innovation
- Seek to institutionalize successful intervention components and replicate them in other settings

Best practices for intervention are often labeled as such based on reviews that emphasize the importance of their internal validity rather than generalizability. Any program, even one that has been labeled as a good program, must undergo a process for selection for a new use (Kahan & Goodstadt, 1998, 2001). Programs shown to be effective in one setting must be adapted for each new community and implementation (Glasgow, Marcus, Bull, & Wilson, 2004; Glasgow, Lichtenstein, & Marcus, 2003; Green, 2001).

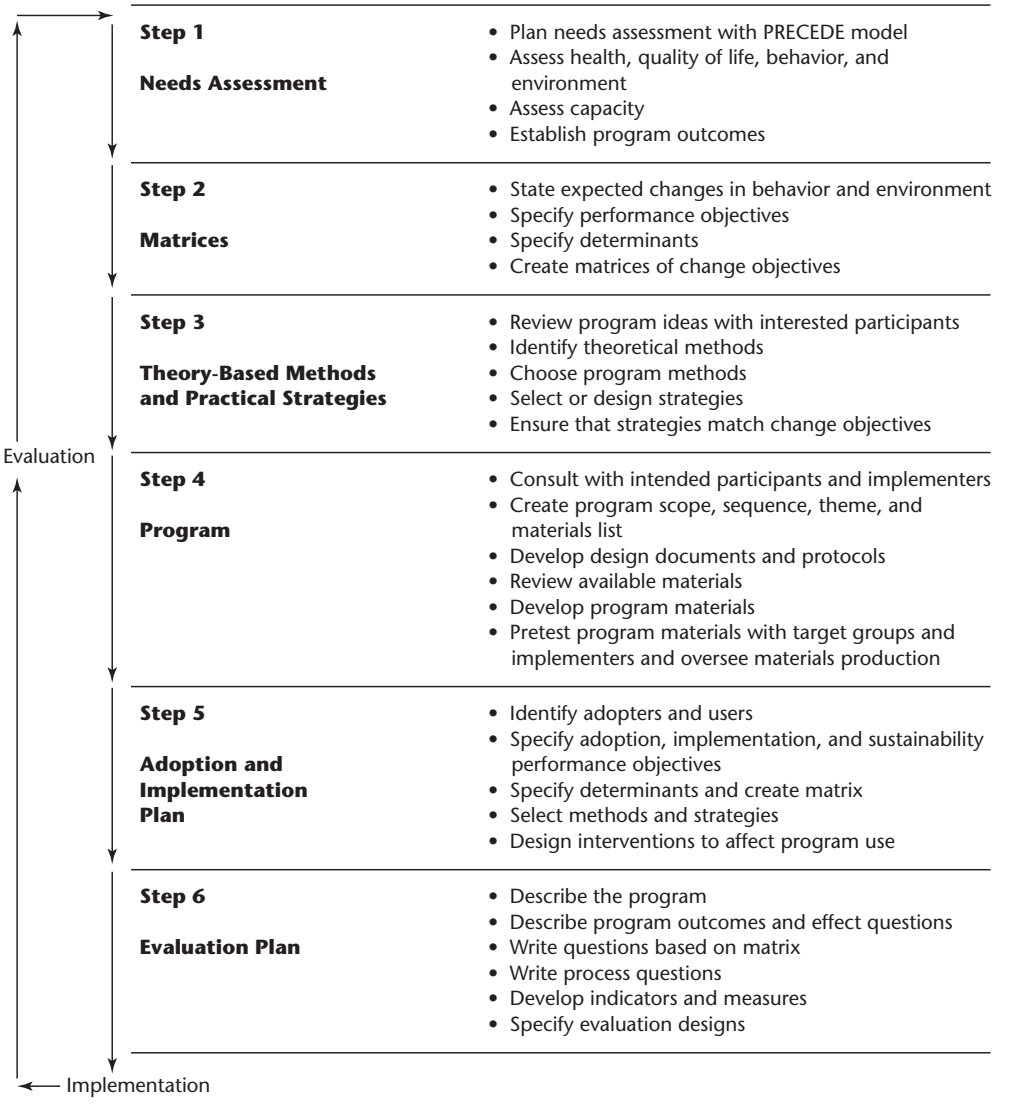
There remains some confusion about how planners can integrate the wealth of information, theories, ideas, and models to develop interventions that are logical and appropriate in their foundations and are practical and acceptable in their administration. The complexity of intervention development is sometimes overlooked in health education training. When we began the development of Intervention Mapping, researchers and practitioners seldom wrote in depth about the process of intervention development, and complicated interventions were often reduced to several sentences in evaluation articles. This situation is slowly changing, and health promotion and other journals have become more hospitable to articles about intervention development. The introduction of a practice-oriented journal in the field has been particularly useful for the description of interventions and their development (Briss et al., 2000; Dodge, Janz, & Clark, 2002; Levy, Anderson, Issel, Willis, Dancy, & Jacobson, 2004; van Empelen, Kok, Schaalma, & Bartholomew, 2003; Lytle & Perry, 2001).

We describe planning processes out of a desire to enable health educators to create programs that are feasible and that have a high likelihood of being effective. Good program planning provides the basis for creative health education practice and provides the vehicles for communicating program specifications to production specialists such as writers and artists. Thorough planning at the beginning of a project can lead to creative developmental and production processes, enhance the intervention's deliverability, and result in the desired outcomes.

Intervention Mapping Steps

Each step of Intervention Mapping comprises several tasks (Figure 1.2). The completion of the tasks in a step creates a product that is the guide for the subsequent step. The completion of all of the steps serves as a blueprint for designing, implementing, and evaluating an intervention based on a foundation of theoretical,

FIGURE 1.2. INTERVENTION MAPPING.



empirical, and practical information. Even though we present Intervention Mapping as a series of steps, the process is iterative rather than completely linear. Program developers move back and forth between tasks and steps as they gain information and perspective from various activities. However, the process is also cumulative. Developers base each step on the previous steps, and inattention to a step can jeopardize the potential effectiveness of the intervention by narrowing the scope and compromising the validity with which later steps are conducted. Sometimes planners can get carried away by momentum in the process of the planning group and forget a step, or they may perform a step with less than optimal rigor. Fortunately, most of the time planners can backtrack and include, repeat, or elaborate on a neglected step.

The six fundamental steps of the Intervention Mapping process are the following:

1. Conduct a needs assessment or problem analysis
2. Create matrices of change objectives based on the determinants of behavior and environmental conditions
3. Select theory-based intervention methods and practical strategies
4. Translate methods and strategies into an organized program
5. Plan for adoption, implementation, and sustainability of the program
6. Generate an evaluation plan

These steps are completed using core processes including the following:

- Posing planning problems as questions that facilitate finding answers from theory, the existing literature, and new research
- Brainstorming answers to planning questions
- Searching the literature for empirical evidence
- Evaluating the strength of the evidence
- Using the issue, concept, and general theories approaches to access theory and empirical evidence to answer the questions
- Addressing the importance of new research for unanswered questions in the planning process

Chapter Two presents these core processes.

Step 1: Needs Assessment

In Step 1 (Chapter Five) before beginning to actually plan an intervention, the planner assesses the health problem, its related behavior and environmental conditions, and their associated determinants for the at-risk populations. This assessment encompasses two components: (1) a scientific, epidemiologic, behavioral, and social analysis of an at-risk group or community and its problems and (2) an

effort to get to know and begin to understand, the character of the community, its members, and its strengths. The product of this first step is a description of a health problem, its impact on quality of life, behavioral and environmental causes, and determinants of behavior and environmental causes.

In Step 1 the planner must complete the following tasks:

1. Establish a planning group that includes potential program participants and plan the needs assessment (Note: This group will evolve over the course of the planning process.)
2. Conduct the needs assessment using the PRECEDE model (Green & Kreuter, 2005) to analyze health and quality of life problems and their causes and to decide on priorities
3. Balance the needs assessment with an assessment of community capacity.
4. Link the needs assessment to evaluation planning by establishing desired program outcomes

Step 2: Matrices of Change Objectives

Step 2 (Chapter Six) provides the foundation for the intervention by specifying who and what will change as a result of the intervention. The product of Step 2 is a set of matrices of selected ecological levels (that is, individual through societal) that combines performance objectives for each level with selected personal and external determinants to produce change objectives, the most immediate target of an intervention. In order to develop performance objectives beyond the individual, the planners identify roles of environmental agents at each selected ecological level. For example, superintendents, principals, and teachers may have roles for school environmental change. Statements of what must be changed at each ecological level and who must make the change are more specific intervention foci than are traditional program goals and objectives. For example, the mayor's planning committee constructed matrices that focused on the school environments in the city, on neighborhood environments including supervised youth activities, and on community cohesion—not only on the behavior of the youths themselves. For another example, in a program to increase fruit and vegetable consumption by children in elementary school, matrices would be created for both the child and the food service. The food service matrix might contain more than one role: for example, the manager's purchasing practices, the dietitian's menu development, and the cooks' recipe choices.

In Step 2 the planner must complete the following tasks:

1. State the expected change or program outcomes for health-related behavior and environmental conditions
2. Subdivide behavior and environmental conditions into performance objectives

3. Select important and changeable personal and external determinants of at-risk group behavior and environmental conditions
4. Create a matrix of change objectives for each level of intervention planning (individual, interpersonal, organizational, community, and societal) by crossing performance objectives with determinants and writing change objectives

Step 3: Theory-Based Methods and Practical Strategies

In Step 3 (Chapter Seven), the planner seeks theory-informed methods and practical strategies to change the health behavior of individuals and related small groups and to change organizational and societal factors to affect the environment. An intervention method is a defined process by which theories postulate and empirical research provides evidence for how change may occur in the behavior of individuals, groups, or social structures. One example of a theory-informed method is modeling, which is frequently used to facilitate behavior change. In Step 3 the planner lists intervention methods that correspond to the change objectives developed in Step 2. These are then used to begin to formulate program activities that will result in achieving the change objectives (Chapter Eight). Whereas a method is a theory-based technique to influence behavior or environmental conditions, a strategy is a way of organizing, operationalizing, and delivering the intervention methods. The translation of selected methods into action is completed through the development of strategies. Examples of strategies include a meeting with community members to form community development task forces for empowerment, a diary for self-monitoring, role-model stories for modeling, a pledge for commitment, and self-talk for cognitive-behavioral rehearsal. A planner working from the food service matrix mentioned in Step 2 might use the methods of persuasion and modeling to influence the food services manager's purchasing practices. Strategies might include testimonials by food service personnel who had incorporated healthier buying practices. If the planner discovered that school district policy was a barrier to changing purchasing practices, he or she would return to Step 2, identify roles at the district level that could influence the policy, write performance objectives for these roles, specify determinants, and construct matrices. These district-level policy changes would then functionally be methods for change at the next lower ecological level, the food service managers and cooks.

In Step 3 the planner must complete the following tasks:

1. Review program ideas with the intended participants and use their perspectives when choosing methods and strategies
2. Use core processes to identify theoretical methods that can influence changes in determinants and identify the conditions under which a given method is most likely to be effective

3. Choose program theoretical methods (Note: The planner must be sure to distinguish between theoretical methods and practical strategies, ensure that all program components contain appropriate methods, and consider preliminary ideas on the program in light of information from theory and evidence.)
4. Select or design practical strategies for delivering the methods to intervention groups
5. Assure that the final strategies (still) match the change objectives from the matrices

Step 4: Program

The products in Step 4 (Chapter Eight) include a description of the scope and sequence of the components of the intervention, completed program materials, and program protocols. This step demands the careful reconsideration of the intended program participants and the program context. It also requires pretesting and pilot testing of program strategies and materials with intended implementers and recipients (Chapter Nine). This step gives specific guidance for communicating program intent to producers (for example, graphic designers, videographers, and writers). The planners of the food service change might organize all their change methods and strategies into creating a program called the *Creative Cooks for Healthy Kids Cooking School*. The "school," however, might include on-the-job training, policy change, newsletters featuring role models, and social reinforcement—or whatever was planned in Step 3 to produce the changes specified in Step 2.

In Step 4 the planner must complete the following tasks:

1. Consult again with the intended participants for a health education and promotion program and bring their preferences to program design
2. Describe program scope and sequence, themes, and needed program materials
3. Prepare design documents that will aid various professions in producing materials that meet the program objectives and adhere to specific guidelines or parameters for particular methods and strategies
4. Review available program materials for possible match with change objectives, methods, and strategies
5. Develop program materials
6. Pretest program materials and oversee the final production

Step 5: Adoption and Implementation

The focus of Step 5 (Chapter Nine) is program adoption and implementation (including consideration of program sustainability). Of course, considerations for program implementation actually begin as early as the needs assessment and are

revisited in this step. The step requires the process of matrix development exactly like that in Step 2, except that these matrices have adoption and implementation performance objectives juxtaposed to personal and external determinants. The linking of each performance objective with a determinant produces a change objective to promote program adoption and use. Methods and strategies are then matched to these objectives to form theory-informed plans for adoption and implementation. For example, the promoters of the food service change would ask the following questions:

- Who is in charge of food service at the school district and at individual schools?
- Who would perceive a need, develop awareness of a program, and choose to adopt the program to make changes in the food service?
- Who would be in charge of implementing the program?
- What, specifically, would these people have to do?

For example, a principal might have to order the program for review, ask the food service manager for his or her opinion of the program, and form a task force for food service change. The planner then uses theory and evidence to hypothesize determinants of the principal's adoption and implementation performance objectives. The product for Step 5 is a detailed plan for accomplishing program adoption and implementation by influencing behavior of individuals or groups who will make decisions about adopting and using the program.

In Step 5 the planner must complete the following tasks:

1. Identify potential users of the health promotion program (revisit the planning group and linkage system to assure representation)
2. Specify performance objectives for program adoption, implementation, and sustainability
3. Specify determinants of adoption, implementation, and sustainability and create change-objective matrices for program use
4. Select methods and strategies to address the change
5. Design interventions and organize programs to affect change objectives related to program use

Step 6: Evaluation Planning

In Step 6 (Chapter Ten), the planner completes an evaluation plan that is actually begun in the needs assessment and is developed along with the intervention map. In the process of Intervention Mapping, planners make decisions about change objectives, methods, strategies, and implementation. The decisions, although informed by theory and evidence from research, still may not be optimal or may

even be completely wrong. Through effect and process evaluation, planners can determine whether decisions were correct at each mapping step (Rossi, Lipsey, & Freeman, 2004; Windsor, Clark, Boyd, & Goodman, 2003; Steckler & Linnan, 2002). To evaluate the effect of an intervention, researchers analyze the change in health and quality-of-life problems, behavior and environment, and determinants of performance objectives. All these variables have been defined in a measurable way during the preceding steps. Effect evaluation may show positive, negative, or mixed effects or show no effect at all. Planners want to understand the reasons behind the effects that were achieved, regardless of what those effects were. They need to know more about the process and the changes in intermediate variables. They ask such questions as the following:

- Were determinants well specified?
- Were strategies well matched to methods?
- What proportion of the priority population did the program reach?
- Was the implementation complete and appropriate?

The product of Step 6 is a plan for answering these questions.

In Step 6 the planner must complete the following tasks:

1. Describe the program and complete the logic model
2. Write evaluation questions based on the program outcome objectives for quality of life, health, behavior, and environment
3. Write evaluation questions based on the matrix, that is, concerning performance objectives and determinants as expressed in the change objectives
4. Write process evaluation questions based on the descriptions of methods, conditions, strategies, program, and implementation
5. Develop indicators and measures
6. Specify evaluation design

Navigating the Book

The process of Intervention Mapping is unchanged from the first edition text. However, we have rearranged the presentation of some aspects of the process. We also have made more explicit use of logic models in the Intervention Mapping steps, and we have introduced the concept of logic models in this section.

Changes from the First Edition

Users familiar with the first edition of *Intervention Mapping* will find several changes that may have an impact on their practice and teaching. The first is the inclusion

of needs assessment as a step in Intervention Mapping rather than a preliminary process. Further, we have clarified and sometimes slightly changed the tasks within each step. In Step 2, the development of matrices, we have tried to decrease confusion about terminology concerning objectives: We now call all objectives within matrix cells change objectives, and we do not refer to the components of the matrices as proximal program objectives.

Other changes will primarily affect navigation of the book: Needs assessment has been moved into the steps sequence (from Chapter Two to Chapter Five). Theories are now presented in two chapters: Chapter Three for theories pertaining to individuals and Chapter Four for theories pertaining to groups and communities. The theoretical material on methods has been moved from Step 3 (Chapter Seven) into the theories chapters.

Foundations

Chapter Two presents the core processes for making empirical literature, formative qualitative and quantitative research and theory accessible and useable in intervention development. It covers core process applications for understanding determinants of behavior, defining health behavior, and generating intervention methods. Chapter Three provides an overview of behavior-oriented theories, which focus on understanding or changing behavior. Chapter Four provides an overview of environment-oriented theories, which focus on understanding or changing environmental conditions.

The Formulation of Matrices as the Program Foundation

In Intervention Mapping, matrices that combine performance objectives with their determinants are the basis for intervention development. They are used in both planning a program (Step 2) and in planning its adoption and implementation (Step 5). If an intervention method or strategy is not intended to change the objectives in the matrices, then either it does not belong in the program or the matrix is not adequate and should be revisited.

We use matrices as a foundation for promoting adoption and implementation because of the importance of promoting a program's use. A program with modest effectiveness could have a great impact if it reached the entire population, while a highly efficacious program would have little or no impact if it was not adopted or implemented fully. Health education programs may be difficult to implement and sustain because they are innovations that cause change in organizational systems. Program planning must include strategies to ensure that those people who will use it with the intended populations adopt the program (Orlandi, 1986, 1987; Smith, Steckler, McCormick, & McLeroy, 1995). In addition, there is a difference between

the potential program efficacy and actual program effectiveness when interventions are transported from their developers to extended use in practice. Program implementation may tend to decline in amount and quality over time. Practitioners must know what is an acceptable level of implementation (Ottoson & Green, 1987) and must plan strategies for program maintenance. As a result of increasing awareness of problems with program diffusion, implementation, and maintenance, health educators have recently been giving more attention to the factors affecting program use (Basen-Engquist, O'Hara-Tompkins, Lovato, Lewis, Parcel, & Gingiss, 1994; Gingiss, Gottlieb, & Brink, 1994; Goodman & Steckler, 1989; Mullen & Mullen, 1983; Oldenburg, Hardcastle, & Kok, 1997; Orlandi, Landers, Weston, & Haley, 1990; Ottoson & Green, 1987; Paulussen, Kok, & Schaalma, 1994; Paulussen, Kok, Schaalma, & Parcel, 1995; Scheirer, 1990; Scheirer & Rezmovic, 1983).

An Iterative Process

In order to describe the intervention and program development process, we have laid out a series of steps. This orderly presentation sometimes wrongly suggests to the reader that every step is completed only once and in a rigid order. This is not the case. Even though each step should provide the basis for the next, only rarely does a step need no revision as the next steps are completed. New information is acquired with each step. And with increasing ideas about the program, knowledge about the intended groups to benefit from the program, community participation, and research and theory, a planner often needs to revisit and fine-tune a previous step. For example, a planning group in the Netherlands included in Step 3 strategies for delivery of role modeling to teens in an HIV-prevention program in schools. When working with teachers on the program in Step 4, planning group members discovered that the teachers were uncomfortable leading role playing, and they had to revisit Step 3 to rethink some of the strategies before completing the program design.

In addition to the process of revisiting prior steps, some "steps" actually weave in and out of the process. For example, evaluation planning begins in the needs assessment and continues in each step until the final plan is completed in Step 6, evaluation. In another example, community participation, including potential program implementers, is begun at the very beginning of a project, continued in each step, and revisited in Step 5, adoption, implementation, and sustainability.

Themes and Conventions Throughout the Book

Several concepts arise repeatedly in the descriptions of Intervention Mapping throughout the book. The first is the set of core processes of accessing, evaluat-

ing, and using empirical literature, theory, and formative research, which is introduced in Chapter Two and used throughout the steps.

Another important concept is that of a logic model to present the relations among concepts, which is introduced in this chapter and used throughout the book. Like the logic model, the concepts of community participation and cultural competence are woven into most chapters. Finally, each chapter on a step in the Intervention Mapping process includes a section on implications for evaluation, which link closely to Step 6, in Chapter Ten.

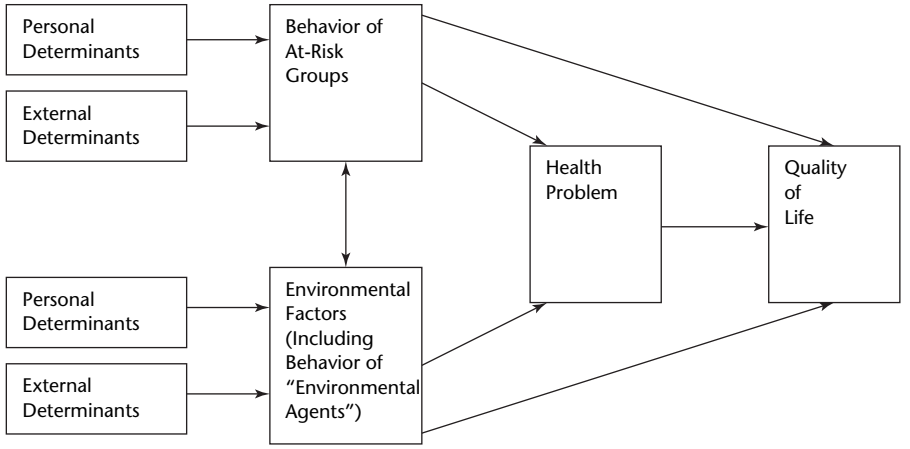
Core Processes. Core processes are common techniques for thinking with theory and evidence. These techniques include asking questions related to aspects of the health problem and its solutions, brainstorming provisional answers, and then using evidence from the literature (both empirical and theoretical), theory, and new data to add to and tighten the logic in the provisional list. These techniques are core intellectual processes for use in program planning, and the Intervention Mapping framework provides the structure for when and how to use them.

Logic Models. Logic models are graphic representations of the demonstrated or hypothesized causal relationships between concepts such as program activities, program output, and outcomes or benefits (Julian, Jones, & Deyo, 1995; Sartourious, 1991; Chen, 1990; Julian, 1997). Logic models can help program developers take into account the complexity of health problems and possible solutions; make explicit the implicit pathways of program effects; and make clear the rationale for program activities (Kirby, 2004). Logic models are commonly being used in program development and evaluation and are a requirement for many funding agencies. (W. K. Kellogg Foundation, 1998; ActKnowledge and Aspen Institute Roundtable, 2004; United Way of America, 1996).

In the process of Intervention Mapping, the planner will build three types of logic models. The first is an *etiologic model* or theory of the problem. Figure 1.3 is based on PRECEDE, a model often used in health education and promotion, and presents the first type of logic model: the description of the causes of health and quality of life problems. In the needs-assessment step (Chapter Five), the planner analyzes and depicts the health, quality of life, behavioral and environmental problems. The planned changes in these will become the program outcomes (Centers for Disease Control & Oak Ridge Institute for Science and Education, 2003; Green and Kreuter, 2005, pp. 103–112).

A second type of logic model is a *change model* created in the matrix step (Chapter Six) and depicting what the program intends to change in the behavior of the risk group and in the environment, as well as the expected determinants of the change. Some authors refer to this as developing a theory of change, theory

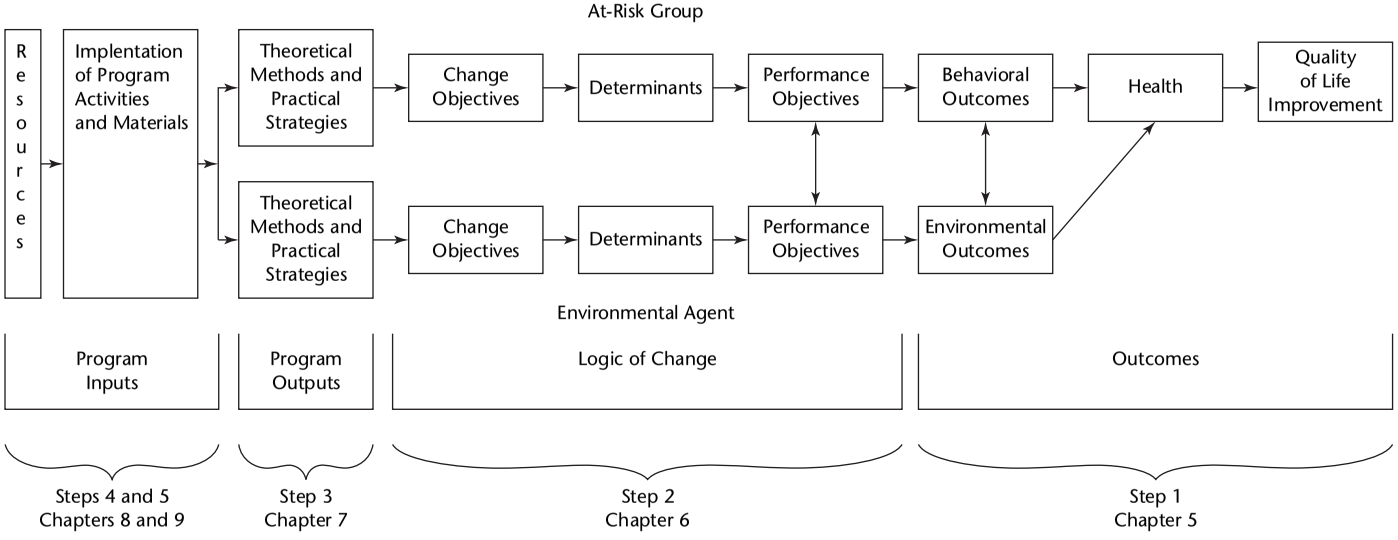
FIGURE 1.3. LOGIC MODEL OF RISK.



Source: Adapted from Green & Kreuter, 2005.

of the program, or a tacit theory (Connell & Kubisch, 1996; Rossi, Lipsey, & Freeman, 2004; Weiss, 1997). We refer to it as the logic of change. These models explain how the program components or activities are thought to influence the social or health problem. Kirby describes these models as behavior, determinants, intervention (BDI) logic models (Kirby, 2004). All of these logic models are intended to carefully describe the variables that must change in order for the program to be effective. Figure 1.4 presents this type of logic within the third type of logic model, the *intervention logic model,* which depicts program components, resources, and activities (program inputs and outputs) along with the outcomes they are meant to effect. In the program development and implementation steps (Chapters Eight and Nine), the planner describes program inputs and outputs. Rossi, Lipsey, and Freeman (2004) call these the service utilization and organizational schematic. This model has the implementation resources as inputs, program activities as outputs, and program effects as outcomes. Kirby (2004) describes a model in which intervention methods, strategies, and program activities are main inputs; while the proposed changes in behavior, environment, and their determinants are the intermediate outputs and changes in health and quality of life, the terminal outputs. The main purpose of logic-model building in this book is to depict the effects of the proposed intervention on health behavior, environmental causes of health problems, health problems themselves, and quality of life.

FIGURE 1.4. INTERVENTION LOGIC MODEL.



In addition to the logic model that is pieced together as intervention development progresses, we present a number of more detailed logic models to help clarify relations among concepts, such as theoretical constructs (Chapters Three and Four). We also use other graphic devices that do not imply causal relations, such as Figure 1.2, a depiction of the steps involved in Intervention Mapping. When a figure is a logic model, that is, implies causal relations, we clearly label it as such. This intervention logic model is developed throughout the Intervention Mapping steps and is used as the basis of evaluation planning (Chapter Ten).

Participation in Planning. In Intervention Mapping our commitment is to bring both a community and a multidisciplinary professional perspective to the process of planning health promotion. Despite the hazards that the health educator in our mayor's project scenario faced, work groups are a critically important fact of life for health educators. Programs cannot be developed in a vacuum, nor should they be developed without stakeholders' participation (Wallerstein, 1992; Israel, Schulz, Parker, Becker, Allen, & Guzman, 2003; Sullivan, Chao, Allen, Kone, Pierre-Louise, & Krieger, 2003; Yoo, Wood, Lampa, Mbondo, Shado, & Goodman, 2004; Hunt, Lederman, Potter, Stoddard, & Sorensen, 2000; Krieger, Allen, Cheadle, Ciske, Schier, Senturia, et al., 2002; Minkler, Thompson, Bell, Rose, & Redman, 2002). Whether health educators develop programs as group participants, or as formal group leaders, they should have a goal of encouraging full participation to bring multiple perspectives to bear on a problem and to create the most intelligent, productive, and sustainable consensus possible. No matter how many so-called experts are involved in program development, the individuals for whom the intervention is intended can best convey the subjective meaning of the health problem and its antecedents. The people who will deliver the program can best convey the realities of the program setting. Ongoing interaction between program planners and potential program users and participants is necessary for the planner to fully understand and convey the real-world program context.

Beginning in Step 1, needs assessment, a very early task for the planner is to establish a planning group that includes stakeholders for the program. Stakeholder groups are all of those who have an interest in a program and its outcomes. The planning group should include representatives of those who are intended to benefit from the program as well as those who will be important to the adoption of the program and its implementation. Orlandi and colleagues (1990) refer to this as a "linkage system" that helps ensure successful program adoption (Chapter Nine).

Cultural Competence. Another theme that appears in each step of Intervention Mapping is the need to create culturally relevant programs for diverse groups. Often health educators work with groups of people who are members of a cultural group different from themselves; often these are underserved groups. The

literature documents the critical issue of health disparities (Institute of Medicine, Committee on Understanding and Eliminating Racial and Ethnic Disparities in Health Care, 2003; Pamuk, Makuc, Heck, Rueben, & Lochner, 1998; Fiscella, Franks, Gold, & Clancy, 2000; Thomas, 2001; Vinicor, Burton, Foster, & Eastman, 2000; Williams & Jackson, 2000). The Healthy People 2010 objectives highlight the health disparities between racial and ethnic groups, with particular emphasis on eliminating those disparities in infant mortality, cancer screening and management, cardiovascular disease, diabetes, HIV/AIDS, and childhood and adult immunizations (U.S. Department of Health and Human Services, 2005). For example, in comparison to whites in the United States, infant mortality rates are 2.5 times higher for African Americans and 1.5 times higher for Native Americans. The prevalence of diabetes in Hispanics is nearly twice that of whites (Pamuk, Makuc, Heck, & Lochner, 1998). In order to address these and many other priority health issues effectively, health educators must be able to develop culturally appropriate programs.

In addition to this explicit association of cultural diversity with race and ethnicity, there are many ways to be a culturally diverse group, and health educators will use the same skills in cultural competence in all program development. For example, in the Netherlands van Kesteren and colleagues are developing an HIV prevention and sexual health program for HIV-positive men who have sex with men (van Kesteren, Hospers, Kok, & van Empelen, 2005). Van Kesteren and colleagues described a specific subgroup structure with definable cultural characteristics, social support mechanisms, and organizations that required the sensitive interaction and reflection in program development (N.M.C. van Kesteren, personal communication, May 2003).

Each planning step requires a specific aspect of a culturally competent approach. In Step 1, needs assessment (Chapter Five), we cover aspects of becoming a more culturally competent practitioner as a prerequisite for beginning a needs assessment and encouraging community participation. In this step we also present the idea of cultural assessment as a part of defining the priority population for the program. In Step 2, matrices (Chapter Six), we discuss the importance of working with the priority population to adequately define the performance objectives and determinants. Without the culturally correct matrix components, no program materials will be salient to the intended cultural group. In Steps 3 and 4, methods, strategies, and programs (Chapters Seven and Eight), we reiterate the importance of maintaining the participation of the intended audience in materials development, and we discuss approaches to creating culturally relevant materials.

Evaluation. Program evaluation always begins with a thorough description of the program to be evaluated and its proposed causal pathways and activities. This description is accomplished step-by-step in Intervention Mapping. First, in the needs

assessment, the planner begins to formulate goals for program outcomes in health and quality of life. These become part of the plan for evaluating effects (Chapter Ten). In Step 2 the planner specifies desired changes in behavior and environment as well as their determinants, which again become further outcomes for evaluating effects. Steps 3, 4, and 5 guide the specification of program components and implementation plans that link closely to process evaluation. Step 3 also contains discussion of pretesting and pilot-testing or formative evaluation of the program.

Summary

Intervention Mapping is presented as a series of steps and processes to help health promotion and health education planners develop theory- and evidence-informed programs. Well-designed and effective interventions should be guided by theory and informed by empirical evidence regarding the target behavior. For example, meta-analyses of cancer-screening interventions have found that larger effect sizes are achieved when interventions are based on theory (Stone, Morton, Hulscher, Maglione, Roth, Grimshaw, et al., 2002; Yabroff, O'Malley, Mangan, & Mandelblatt, 2001; Yabroff & Mandelblatt, 1999). However, no one theoretical model completely predicts or explains health behaviors (Rakowski & Breslau, 2004; Institute of Medicine, 2004; Rimer, 2002). Therefore, a system is needed to help intervention developers choose useful theories and integrate relevant constructs from multiple theories to describe health problems and develop health promotion and health education solutions (van Bokhoven, Kok, & van der Weijden, 2003; Kok, Schaalma, Ruiter, van Empelen, & Brug, 2004).

Specifically, Intervention Mapping ensures that theoretical models and empirical evidence guide planners in two areas:

- The identification of behavioral and environmental determinants related to a target health problem
- The selection of the most appropriate methods and strategies to address the identified determinants

Intervention Mapping has been used to develop intervention programs for asthma management (Bartholomew, Gold, Parcel, Czyzewski, Sockrider, & Fernandez, 2000; Fernandez, Bartholomew, Lopez, Tyrrell, Czyzewski, & Sockrider, 2000; Shegog, Bartholomew, Parcel, Sockrider, Masse, & Abramson, 2001; Bartholomew, Shegog, Parcel, Gold, Fernandez, Czyzewski, et al., 2000), nutrition (Cullen, Bartholomew, Parcel, & Kok, 1998; Cullen, Bartholomew, & Parcel, 1997; Hoelscher, Evans, Parcel, & Kelder, 2002), sun protection (Tripp, Herrmann, Par-

cel, Chamberlain, & Gritz, 2000), adolescent risk taking (Tortolero, Bartholomew, Abramson, Sockrider, Jones, Tyrrell, et al., 2005), violence (Murray, Kelder, Parcel, & Orpinas, 1998), HIV prevention (van Empelen, Kok, Schaalma, & Bartholomew, 2003), cervical cancer screening (Hou, Fernandez, & Parcel, 2004; Hou, Fernandez, Baumler, & Parcel, 2002; Hou, Fernandez, & Parcel, 2004), mammography (Fernandez et al., 2005), colorectal cancer screening (Vernon, 2004), leg ulcers (Heinen, Bartholomew, Wensing, van de Kerkhof, & van Achterberg, 2005) and acute stroke therapy (Morgenstern, Bartholomew, Grotta, Staub, King, & Chan, 2003; Morgenstern, Staub, Chan, Wein, Bartholomew, King, et al., 2002). Even though Intervention Mapping has not been directly compared to other processes for developing interventions, planners working on these projects think that the systematic process has been useful and will strengthen future program development (Hoelscher, Evans, Parcel, & Kelder, 2002).