CHAPTER 6
UNDERSTANDING AND PROMOTING PHYSICAL ACTIVITY

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CHAPTER 6
UNDERSTANDING AND PROMOTING PHYSICAL ACTIVITY

Introduction

As the benefits of moderate, regular physical activity have become more widely recognized, the need has increased for interventions that can promote this healthful behavior. Because theories and models of human behavior can guide the development and refinement of intervention efforts, this chapter first briefly examines elements of behavioral and social science theories and models that have been used to guide much of the research on physical activity. First for adults, then for children and adolescents, the chapter reviews factors influencing physical activity and describes interventions that have sought to improve participation in regular physical activity among these two age groups. To put in perspective the problem of increasing individual participation in physical activity, the chapter next examines societal barriers to engaging in physical activity and describes existing resources that can increase opportunities for activity. The chapter concludes with a summary of what is known about determinant and intervention research on physical activity and makes recommendations for research and practice.

Theories and Models Used in Behavioral and Social Science Research on Physical Activity

Numerous theories and models have been used in behavioral and social science research on physical activity. These approaches vary in their applicability to physical activity research. Some models and theories were designed primarily as guides to understanding behavior, not as guides for designing interventions. Others were specifically constructed with a view toward developing interventions, and some of these have been applied extensively in intervention research as well. Because most were developed to explain the behavior of individuals and to guide individual and small-group intervention programs, these models and theories may have only limited application to understanding the behavior of populations or designing communitywide interventions. Key elements most frequently used in the behavioral and social science research on physical activity are described below and summarized in Table 6-1.

Learning Theories

Learning theories emphasize that learning a new, complex pattern of behavior, like changing from a sedentary to an active lifestyle, normally requires modifying many of the small behaviors that compose an overall complex behavior (Skinner 1953). Principles of behavior modification suggest that a complex-pattern behavior, such as walking continuously for 30 minutes daily, can be learned by first breaking it down into smaller segments (e.g., walking for 10 minutes daily). Behaviors that are steps toward a final goal need to be reinforced and established first, with rewards given for partial accomplishment if necessary. Incremental increases, such as adding 5 minutes to the daily walking each week, are then made as the complex pattern of behaviors is "shaped" toward the targeted goal. A further complication to the change process is that new patterns of physical activity behavior must replace or compete with former patterns of inactive behaviors that are often satisfying (e.g., watching television), habitual behaviors (e.g., parking close to the door), or behaviors cued by the environment (e.g., the presence of an elevator).

Reinforcement describes the consequences that motivate individuals either to continue or discontinue a behavior (Skinner 1953; Bandura 1986).

Table 6-1. Summary of theories and models used in physical activity research

Theory/model	Level	Key concepts
Classic learning theories	Individual	Reinforcement Cues Shaping
Health belief model	Individual	Perceived susceptibility Perceived severity Perceived benefits Perceived barriers Cues to action Self-efficacy
Transtheoretical model	Individual	Precontemplation Contemplation Preparation Action Maintenance
Relapse prevention	Individual	Skills training Cognitive reframing Lifestyle rebalancing
Social cognitive theory	Interpersonal	Reciprocal determinism Behavioral capability Self-efficacy Outcome expectations Observational learning Reinforcement

Theory of planned behavior	Interpersonal	Attitude toward the behavior
		  Outcome expectations
		  Value of outcome expectations
		Subjective norm
		  Beliefs of others
		  Motive to comply with others
		Perceived behavioral control

Social support	Interpersonal	Instrumental support Informational support Emotional support Appraisal support

Ecological perspective	Environmental	Multiple levels of influence
		  Intrapersonal
		  Interpersonal
		  Institutional
		  Community
		  Public policy

Source: Adapted from Glanz K and Rimer BK. *Theory at-a-glance: a guide for health promotion practice,* U.S. Department of Health and Human Services, 1995.

Most behaviors, including physical activity, are learned and maintained under fairly complex schedules of reinforcement and anticipated future rewards. Future rewards or incentives may include physical consequences (e.g., looking better), extrinsic rewards (e.g., receiving praise and encouragement from others, receiving a T-shirt), and intrinsic rewards (e.g., experiencing a feeling of accomplishment or gratification from attaining a personal milestone). It is important to note that although providing praise, encouragement, and other extrinsic rewards may help people adopt positive lifestyle behaviors, such external reinforcement may not be reliable in sustaining long-term change (Glanz and Rimer 1995).

Health Belief Model

The health belief model stipulates that a person's health-related behavior depends on the person's perception of four critical areas: the severity of a potential illness, the person's susceptibility to that illness, the benefits of taking a preventive action, and the barriers to taking that action (Hochbaum 1958; Rosenstock 1960, 1966). The model also incorporates cues to action (e.g., leaving a written reminder to oneself to walk) as important elements in eliciting or maintaining patterns of behavior (Becker 1974). The construct of self-efficacy, or a person's confidence in his or her ability to successfully perform an action (discussed in more detail later in this chapter), has been added to the model (Rosenstock 1990), perhaps allowing it to better account for habitual behaviors, such as a physically active lifestyle.

Transtheoretical Model

In this model, behavior change has been conceptualized as a five-stage process or continuum related to a person's readiness to change: precontemplation, contemplation, preparation, action, and maintenance (Prochaska and DiClemente 1982, 1984). People are thought to progress through these stages at varying rates, often moving back and forth along the continuum a number of times before attaining the goal of maintenance. Therefore, the stages of change are better described as spiraling or cyclical rather than linear (Prochaska, DiClemente, Norcross 1992). In this model, people use different processes of change as they move from one stage of change to another. Efficient self-change thus depends on doing the right thing (processes) at the right time (stages) (Prochaska, DiClemente, Norcross 1992). According to this theory, tailoring interventions to match a person's readiness or stage of change is essential (Marcus and Owen 1992). For example, for people who are not yet contemplating becoming more active, encouraging a step-by-step movement along the continuum of change may be more effective than encouraging them to move directly into action (Marcus, Banspach, et al. 1992).

Relapse Prevention Model

Some researchers have used concepts of relapse prevention (Marlatt and Gordon 1985) to help new exercisers anticipate problems with adherence. Factors that contribute to relapse include negative emotional or physiologic states, limited coping skills, social pressure, interpersonal conflict, limited social support, low motivation, high-risk situations, and stress (Brownell et al. 1986; Marlatt and George 1990). Principles of relapse prevention include identifying high-risk situations for relapse (e.g., change in season) and developing appropriate solutions (e.g., finding a place to walk inside during the winter). Helping people distinguish between a lapse (e.g., a few days of not participating in their planned activity) and a relapse (e.g., an extended period of not participating) is thought to improve adherence (Dishman 1991; Marcus and Stanton 1993).

Theory of Reasoned Action and Theory of Planned Behavior

The theory of reasoned action (Fishbein and Ajzen 1975; Ajzen and Fishbein 1980) states that individual performance of a given behavior is primarily determined by a person's intention to perform that behavior. This intention is determined by two major factors: the person's attitude toward the behavior (i.e., beliefs about the outcomes of the behavior and the value of these outcomes) and the influence of the person's social environment or subjective norm (i.e., beliefs about what other people think the person should do, as well as the person's motivation to comply with the opinions of others). The theory of planned behavior (Ajzen 1985, 1988) adds to the theory of reasoned action the concept of perceived control over the opportunities, resources, and skills necessary to perform a behavior. Ajzen's concept of

perceived behavioral control is similar to Bandura's (1977a) concept of self-efficacy—a person's perception of his or her ability to perform the behavior (Ajzen 1985, 1988). Perceived behavioral control over opportunities, resources, and skills necessary to perform a behavior is believed to be a critical aspect of behavior change processes.

Social Learning/Social Cognitive Theory

Social learning theory (Bandura 1977b), later renamed social cognitive theory (Bandura 1986), proposes that behavior change is affected by environmental influences, personal factors, and attributes of the behavior itself (Bandura 1977b). Each may affect or be affected by either of the other two. A central tenet of social cognitive theory is the concept of self-efficacy. A person must believe in his or her capability to perform the behavior (i.e., the person must possess self-efficacy) and must perceive an incentive to do so (i.e., the person's positive expectations from performing the behavior must outweigh the negative expectations). Additionally, a person must value the outcomes or consequences that he or she believes will occur as a result of performing a specific behavior or action. Outcomes may be classified as having immediate benefits (e.g., feeling energized following physical activity) or long-term benefits (e.g., experiencing improvements in cardiovascular health as a result of physical activity). But because these expected outcomes are filtered through a person's expectations or perceptions of being able to perform the behavior in the first place, self-efficacy is believed to be the single most important characteristic that determines a person's behavior change (Bandura 1986).

Self-efficacy can be increased in several ways, among them by providing clear instructions, providing the opportunity for skill development or training, and modeling the desired behavior. To be effective, models must evoke trust, admiration, and respect from the observer; models must not, however, appear to represent a level of behavior that the observer is unable to visualize attaining (Bandura 1986).

Social Support

Often associated with health behaviors such as physical activity, social support is frequently used in behavioral and social research. There is, however, considerable variation in how social support is conceptualized and measured (Israel and Schurman 1990). Social support for physical activity can be instrumental, as in giving a nondriver a ride to an exercise class; informational, as in telling someone about a walking program in the neighborhood; emotional, as in calling to see how someone is faring with a new walking program; or appraising, as in providing feedback and reinforcement in learning a new skill (Israel and Schurman 1990). Sources of support for physical activity include family members, friends, neighbors, co-workers, and exercise program leaders and participants.

Ecological Approaches

A criticism of most theories and models of behavior change is that they emphasize individual behavior change processes and pay little attention to sociocultural and physical environmental influences on behavior (McLeroy et al. 1988). Recently, interest has developed in ecological approaches to increasing participation in physical activity (McLeroy et al. 1988; CDC 1988; Stokols 1992). These approaches place the creation of supportive environments on a par with the development of personal skills and the reorientation of health services. Stokols (1992) and Simons-Morton and colleagues (CDC 1988; Simons-Morton, Simons-Morton, et al. 1988) have illustrated this concept of a health-promoting environment by describing how physical activity could be promoted by establishing environmental supports, such as bike paths, parks, and incentives to encourage walking or bicycling to work.

An underlying theme of ecological perspectives is that the most effective interventions occur on multiple levels. McLeroy and colleagues (1988), for example, have proposed a model that encompasses several levels of influences on health behaviors: intrapersonal factors, interpersonal and group factors, institutional factors, community factors, and public policy. Similarly, a model advanced by Simons-Morton and colleagues (CDC 1988) has three levels (individual, organizational, and governmental) in four settings (schools, worksites, health care institutions, and communities). Interventions that simultaneously influence these multiple levels and multiple settings may be expected to lead to greater and longer-lasting changes and maintenance of existing health-promoting habits. This is a promising area for

the design of future intervention research to promote physical activity.

Summary

Some similarities can be noted among the behavioral and social science theories and models used to understand and enhance health behaviors such as physical activity. Many of the theoretical approaches highlight the role of the perceived outcomes of behavior, although different terms are used for this construct, including perceived benefits and barriers (health belief model) and outcome expectations (social cognitive theory and theory of planned behavior) (Table 6-1). Several approaches also emphasize the influence of perceptions of control over behavior; this influence is given labels such as self-efficacy (health belief model, social cognitive theory) and perceived behavioral control (theory of planned behavior). Other theories and models feature the role of social influences, as in the concepts of observational learning (social cognitive theory), perceived norm (theory of reasoned action and theory of planned behavior), social support, and interpersonal influences (ecological perspective). Most of the theories and models, however, do not address the influence of the environment on health behavior.

Behavioral Research on Physical Activity among Adults

Behavioral research in this area includes studies on both the factors influencing physical activity among adults (determinants research) and the effectiveness of strategies and programs to increase this behavior (interventions research). Although many of the key concepts presented in the preceding section are featured in both types of research presented here, neither area is limited to those concepts only.

Factors Influencing Physical Activity among Adults

Research on the determinants of physical activity identifies those factors associated with, or predictive of, this behavior. This section reviews determinants studies in which the measured outcome was overall physical activity, adherence to or continued participation in structured physical activity programs, or movement from one stage of change to another (e.g., from contemplation to preparation). The section does not review studies in which the outcome measured was an intermediate measure of physical activity (e.g., intentions concerning future participation in physical activity). Although researchers have studied a wide array of potential influences on physical activity among adults, the section focuses on factors that can be modified, such as self-efficacy and social support, rather than on factors that cannot be changed, such as age, sex, and race/ethnicity.

Modifiable Determinants

The modifiable determinants of adult physical activity include personal, interpersonal, and environmental factors (Table 6-1). Self-efficacy, a construct from social cognitive theory, has been consistently and positively associated with adult physical activity (Courneya and McAuley 1994; Desmond et al. 1993; Hofstetter et al. 1991; Yordy and Lent 1993), physical activity stage of change (Marcus, Eaton, et al. 1994; Marcus and Owen 1992; Marcus, Pinto, et al. 1994; Marcus, Selby, et al. 1992), and adherence to structured physical activity programs (DuCharme and Brawley 1995; Duncan and McAuley 1993; McAuley, Lox, Duncan 1993; Poag-DuCharme and Brawley 1993; Robertson and Keller 1992). The evidence is less conclusive, however, for the theory of planned behavior's construct of perceived behavioral control (Courneya 1995; Courneya and McAuley 1995; Godin et al. 1991, 1995; Godin, Valois, Lepage 1993; Kimiecik 1992; Yordy and Lent 1993).

Several studies have found no association between adult physical activity (whether physical activity, stage of change, or adherence) and either the health belief model's constructs of perceived benefits (Hofstetter et al. 1991; Mirotznik, Feldman, Stein 1995; Oldridge and Streiner 1990; Taggart and Connor 1995) and perceived barriers (Desmond et al. 1993; Godin et al. 1995; Neuberger et al. 1994; Oldridge and Streiner 1990; Taggart and Connor 1995) or the theory of reasoned action and theory of planned behavior's construct of attitude toward the behavior (Courneya and McAuley 1995; Godin, Valois, Lepage 1993; Hawkes and Holm 1993). Nonetheless, the cumulative body of evidence supports the conclusion that expectations of both positive (e.g., benefits) and negative (e.g., barriers) behavioral outcomes are associated with physical activity among adults. Expectation of positive outcomes or

perceived benefits of physical activity has been consistently and positively associated with adult physical activity (Ali and Twibell 1995; Neuberger et al. 1994), physical activity stage of change (Booth et al. 1993; Calfas et al. 1994; Eaton et al. 1993; Marcus, Eaton, et al. 1994; Marcus and Owen 1992; Marcus, Pinto, et al. 1994; Marcus, Rakowski, Rossi 1992), and adherence to structured physical activity programs (Lynch et al. 1992; Robertson and Keller 1992). Conversely, the construct of perceived barriers to physical activity has been negatively associated with adult physical activity (Ali and Twibell 1995; Dishman and Steinhardt 1990; Godin et al. 1991; Hofstetter et al. 1991; Horne 1994), physical activity stage of change (Calfas et al. 1994; Lee 1993; Marcus, Eaton, et al. 1994; Marcus and Owen 1992; Marcus, Pinto, et al. 1994; Marcus, Rakowski, Rossi 1992), and adherence to structured physical activity programs (Howze, Smith, DiGilio 1989; Mirotznik et al. 1995; Robertson and Keller 1992). Additionally, attitude toward the behavior (outcome expectations and their values) has been consistently and positively related to physical activity (Courneya and McAuley 1994; Dishman and Steinhardt 1990; Godin et al. 1987, 1991; Kimiecik 1992; Yordy and Lent 1993) and stage of change (Courneya 1995).

Social support from family and friends has been consistently and positively related to adult physical activity (Felton and Parsons 1994; Horne 1994; Minor and Brown 1993; Sallis, Hovell, Hofstetter 1992; Treiber et al. 1991), stage of change (Lee 1993), and adherence to structured exercise programs (Duncan and McAuley 1993; Elward, Larson, Wagner 1992). Behavioral intention, a construct from the theory of reasoned action and the theory of planned behavior, also has consistently been associated with adult physical activity (Courneya and McAuley 1994; Godin et al. 1987, 1991; Godin, Valois, Lepage 1993; Kimiecik 1992; Yordy and Lent 1993), stage of change (Courneya 1995), and adherence to structured exercise programs (Courneya and McAuley 1995; DuCharme and Brawley 1995). Conversely, the construct of subjective norm from these theories has been both positively associated (Courneya 1995; Godin et al. 1987, 1991; Hawkes and Holm 1993; Kimiecik 1992; Yordy and Lent 1993) and not associated (Courneya and McAuley 1995; Godin et al. 1995; Hofstetter et al. 1991) with adult physical activity, stage of change, and adherence to structured exercise programs.

There is also mixed evidence regarding the positive relationship between the health belief model's construct of perceived severity of diseases and either physical activity (Godin et al. 1991) or adherence to structured exercise programs (Lynch et al. 1992; Mirotznik, Feldman, Stein 1995; Oldridge and Streiner 1990; Robertson and Keller 1992). Additionally, that model's construct of perceived susceptibility to illness has been unrelated to adult adherence to structured exercise programs (Lynch et al. 1992; Mirotznik et al. 1995; Oldridge and Streiner 1990).

The cumulative body of determinants research consistently reveals that exercise enjoyment is a determinant that has been positively associated with adult physical activity (Courneya and McAuley 1994; Horne 1994; McAuley 1991), stage of change (Calfas et al. 1994), and adherence to structured exercise programs (Wilson et al. 1994). Conversely, there has been no relationship between locus of control beliefs (i.e., perceptions of personal control over health, fitness, or physical activity) and either adult physical activity (Ali and Twibell 1995; Burk and Kimiecik 1994; Dishman and Steinhardt 1990; Duffy and MacDonald 1990) or adherence to structured exercise programs (Lynch et al. 1992; Oldridge and Streiner 1990). Although previous physical activity during adulthood has been consistently related to physical activity among adults (Godin et al. 1987, 1993; Minor and Brown 1993; Sharpe and Connell 1992) and stage of change (Eaton et al. 1993), history of physical activity during youth has been unrelated to adult physical activity (Powell and Dysinger 1987; Sallis, Hovell, Hofstetter 1992).

Determinants for Population Subgroups

Few determinants studies of heterogeneous samples have examined similar sets of characteristics in subgroups. Self-efficacy is the variable with the strongest and most consistent association with physical activity in different subgroups from the same large study sample. Self-efficacy has been positively related to physical activity among men, women, younger adults, older adults (Sallis et al. 1989), Latinos (Hovell et al. 1991), overweight persons (Hovell et al. 1990), and persons with injuries or disabilities (Hofstetter et al. 1991). The generalizability of the self-efficacy associations is extended by studies of university students and alumni (Calfas et al. 1994; Courneya and McAuley 1994; Yordy and Lent 1993), employed

women (Marcus, Pinto, et al. 1994), participants in structured exercise programs (Duncan and McAuley 1993; McAuley, Lox, Duncan 1993; Poag-DuCharme and Brawley 1993), and people with coronary heart disease (CHD) (Robertson and Keller 1992).

Summary

Ideally, theories and models of behavioral and social science could be used to guide research concerning the factors that influence adult physical activity. In actuality, the application of these approaches to determinants research in physical activity has generally been limited to individual and interpersonal theories and models. Social support and some factors from social cognitive theory, such as confidence in one's ability to engage in physical activity (i.e., self-efficacy) and beliefs about the outcome of physical activity, have been consistently related to physical activity among adults. Factors from other theories and models, however, have received mixed support. Although perceptions of the benefits of, and barriers to, physical activity have been consistently related to physical activity among adults, other constructs from the health belief model, such as perceptions of susceptibility to, and the severity of, disease, have not been related to adult physical activity. Further, constructs from the theory of reasoned action and the theory of planned behavior, including intentions and beliefs about the outcomes of behavior, have been consistently related to adult physical activity, whereas there has been equivocal evidence of this relationship for normative beliefs and perceptions of the difficulty of engaging in the behavior. Exercise enjoyment, a determinant that does not derive directly from any of the behavioral theories and models, has been consistently associated with adult physical activity.

Few studies have specifically contrasted physical activity determinants among different sex, age, racial/ethnic, geographic location, or health status subgroups. Many studies contain relatively homogeneous samples of groups, such as young adults, elderly persons, white adults, participants in weight loss groups, members of health clubs, persons with heart disease, and persons with arthritis. Because the numbers of participants in the studies that include these subgroups are small, and because the studies evaluated different factors, making comparisons between studies is problematic.

Interventions to Promote Physical Activity among Adults

This section reviews intervention studies in which the measured outcome was physical activity, adherence to physical activity, or movement in stage of change (Table 6-2). It does not include intervention studies designed to assess the effect of physical activity on health outcomes or risk factors (see Chapter 4). Further, this review places special emphasis on experimental and quasi-experimental studies, which are better able to control the influence of other factors and thus to determine if the outcomes were due to the intervention itself (Weiss 1972).

Individual Approaches

Individual behavioral management approaches, including those derived from learning theories, relapse prevention, stages of change, and social learning theory, have been used with mixed success in numerous intervention studies designed to increase physical activity (Table 6-2). Behavioral management approaches that have been applied include self-monitoring, feedback, reinforcement, contracting, incentives and contests, goal setting, skills training to prevent relapse, behavioral counseling, and prompts or reminders. Applications have been carried out in person, by mail, one-on-one, and in group settings. Typically, researchers have employed these in combination with other behavioral management approaches or with those derived from other theories, such as social support, making it more difficult to ascertain their specific effects. In numerous instances, physical activity was only one of several behaviors addressed in an intervention, which also makes it difficult to determine the extent that physical activity was emphasized as an intervention component relative to other components.

Self-monitoring of physical activity behavior has been one of the most frequently employed behavioral management techniques. Typically, it has involved individuals keeping written records of their physical activity, such as number of episodes per week, time spent per episode, and feelings during exercising. In one study, women who joined a health club were randomly assigned to a control condition or one of two intervention conditions—self-monitoring of attendance or self-monitoring plus extra staff attention (Weber and Wertheim 1989). Overall, women in the

Table 6-2. Studies of interventions to increase physical activity among adults

Study	Design	Theoretical approach	Population
Individual approaches			
Weber and Wertheim (1989)	3 month experimental	Self-monitoring	55 women who joined a gym; mean age = 27
King, Haskell, et al. (1995)	2 year experimental	Behavioral management	269 white adults aged 50–65 years
Lombard, Lombard, Winett (1995)	24 week experimental	Stages of change	155 university faculty and staff; mostly women
Cardinal and Sachs (1995)	12 week experimental	Stages of change	113 clerical staff at a university; mean age = 37; 63% black
Belisle (1987)	10 week quasi-experimental with 3-month follow-up	Relapse prevention	350 people enrolled in beginning exercise groups
Gossard et al. (1986)	12 week experimental	Behavioral management	64 overweight healthy men aged 40–60 years
King, Carl, et al. (1988)	16 week pretest-posttest	Behavioral management	38 blue-collar university employees; mean age = 45
King and Frederiksen (1984)	3 month experimental	Relapse prevention, social support, behavioral management	58 college women aged 18–20 years
King, Taylor, et al. (1988)	Study 1: 6 month experimental	Relapse prevention, behavioral management	152 Lockheed employees aged 42–55 years
	Study 2: 6 month experimental	Behavioral management	Lockheed employees from Study 1

I = intervention; C = control or comparison group.

Intervention	Findings and comments
I-1: Self-monitoring of attendance, fitness exam I-2: Self-monitoring, staff attention, fitness exam C: Fitness exam	I-1 had better attendance than I-2 overall; interest in self-monitoring waned after 4 weeks
I-1: Self-monitoring, telephone contact, vigorous exercise at home I-2: Self-monitoring, telephone contact, moderate exercise at home I-3: Self-monitoring, vigorous exercise in group	Better exercise adherence at 1 year in home-based groups; at year 2 better adherence in vigorous home-based group; 5 times per week schedule may have been difficult to follow
I-1: Weekly calls, general inquiry I-2: Weekly calls, structured inquiry I-3: Call every 3 weeks, general inquiry I-4: Call every 3 weeks, structured inquiry	Frequent call conditions had 63% walking compared with 26% and 22% in the infrequent condition; frequent call and structured inquiry had higher rate of walking than other groups
I-1: Mail-delivered lifestyle packet based on stages of change I-2: Mail-delivered structured exercise packet with exercise prescription C: Mail-delivered fitness feedback packet	No difference in stage of change status among or within groups
I: Exercise class and relapse prevention training C: Exercise class results across experimental groups	Higher attendance in relapse prevention group over 10 weeks and at 3 months; high attrition and inconsistent
I-1: Vigorous self-directed exercise, staff telephone calls, self-monitoring I-2: Moderate self-directed exercise, staff telephone calls, self-monitoring C: Staff telephone calls	Better adherence in the moderate-intensity group at 12 weeks compared with vigorous (96% vs. 90%) (no statistical tests reported); travel, work schedule conflicts, and weather were noted as barriers to physical activity
I: 90-minute classes 2 times/week after work, parcourse, self-monitoring, contests C: None	Twofold increase in bouts of exercise compared with nonparticipants. Participants different from nonparticipants at baseline
I-1: Team building, relapse prevention training; group exercise I-2: Team building, group exercise I-3: Relapse prevention training and jogging alone C: Jogging alone	I-2 and I-3 had twice the jogging episodes as I-1 and C at 5 weeks; at 3 months, 83% of I-3 were jogging compared with 38% of I-1 and I-2 and 36% of C
I-1: Home-based moderate exercise, self-monitoring with portable monitor, relapse prevention training, telephone calls from staff I-2: Same as I-1 without telephone calls from staff	No difference in number of sessions and duration reported at 6-month follow-up
I-1: Daily self-monitoring I-2: Weekly self-monitoring	I-1 had more exercise bouts per month (11 vs. 7.5)

Table 6-2. *Continued*

Study	Design	Theoretical approach	Population
Marcus and Stanton (1993)	18 week experimental	Relapse prevention, social learning theory	120 female university employees, mean age = 35
McAuley et al. (1994)	5 month experimental	Social learning theory	114 sedentary middle-aged adults
Owen et al. (1987)	12 week quasi-experimental	Behavioral management	343 white-collar and professional workers, mean age = 36, mostly women
Robison et al. (1992)	6 month quasi-experimental	Behavioral management, social support	137 university staff at 6 campus worksites, mean age = 40
Interventions in health care settings			
Logsdon, Lazaro, Meier (1989) (INSURE)	1 year quasi-experimental	None mentioned	2,218 patients from multi-specialty group practice sites
Calfas et al. (in press)	2 week quasi-experimental	Stage of change	212 patients
Community approaches			
Luepker et al. (1994) (Minnesota Heart Health Project)	5 to 6 year quasi-experimental; 3 matchedpairs	Diffusion of innovations, social learning theory, community organization, communication theory	Community longitudinal cohort (n = 7,097), independent survey (n = 300–500)
Young et al. (in press) (Stanford Five-City Project)	7 year quasi-experimental	Social learning theory, communication theory, community organization	2 sets of paired, medium-sized cities (5th city used for surveillance only)
Macera et al. (1995)	4 year quasi-experimental (2 matched communities)	None specified	Community residents ≥ 18 years; 24% African American (I), 35% African American (C)
Brownson et al. (1996)	4 year quasi-experimental	Social learning theory, stage theory of innovation	Rural communities; largely African American

I = intervention; C = control or comparison group.

Intervention	Findings and comments
I-1: Relapse prevention training and exercise I-2: Scheduled reinforcement for attendance and exercise C: Exercise only	Better attendance in I-1 at 9 weeks; no difference at 18 weeks or 2-month follow-up
I: Modeling of exercise, provision of efficacy-based information (mastery accomplishments, social modeling, social persuasion, physiological response), walking program C: Biweekly meetings on health information, walking program	Better class attendance (67% vs. 55%) and more minutes and miles walked among intervention group than controls
I: Self-management instruction, exercise class C: Exercise class	No difference in activity levels at 6 months
I: Weekly group meetings, contracts, cash incentives, social support, exercise C: Exercise, diary	Higher attendance among experimental groups than comparison groups (93–99% vs. 19%)
I: Screening and counseling from physicians who received continuing education; preventive visits at no charge	Increase in starting to exercise among intervention patients (34% to 24%)
I: Physician counseling; booster call from a health educator C: Nothing	Intervention patients increased walking (37 minutes vs. 10 minutes per week)
I: Screening and education; mass media; community participation; environmental change; professional education; youth and adults C: Nothing	Percent physically active higher in independent survey at 3 years; higher in the cohort at 7 years
I: Print materials; workshops and seminars; organized walking; organized walking events; "Heart & Sole" groups; worksite programs; TV spots	Men increased participation in vigorous activities; men and women in the intervention communities increased their overall number of physical activities; significant differences between intervention and comparison communities at baseline
I: Community cardiovascular risk reduction activities C: None specified	No difference in physical activity prevalence, physican counseling for exercise, or exercise knowledge
I: Community organization; development of 6 coalitions; exercise classes and walking classes and walking clubs; demonstrations; sermons; newspaper articles; community improvements; $5,000 to each coalition from the state health department	Increased physical activity levels in coalition communities, declining levels in communities without; net effect was 7%. Planned Approach to Community Health education planning model

Table 6-2. *Continued*

Study	Design	Theoretical approach	Population
Marcus, Banspach, et al. (1992) (Pawtucket Heart Health Program: Imagine Action)	6 week pretest-posttest uncontrolled	Stages of change	610 sample of community residents, mean age = 42
Worksites			
Blair et al. (1986) (Live for Life)	2 year quasi-experimental	None	4,300 Johnson & Johnson employees
Fries et al. (1993)	24 month experimental	None	4,712 Bank of America retirees
Heirich et al. (1993)	3 year experimental	None specified	1,300 automobile plant workers
Communication			
Osler and Jespersen (1993)	2 year quasi-experimental	Social learning theory, communications (diffusion of innovations); community organization	Rural communities in Denmark (n = 8,000 [I])
Owen et al. (1995)	2 year pretest-posttest	Social learning theory, social marketing theory	2 national physical activity campaigns in Australia
Brownell, Stunkard, Albaum (1980)	Study 1: 8 week quasi-experimental	None specified	21,091 general public observations at a mall, train station, bus terminal
	Study 2: 4 month quasi-experimental	None specified	24,603 general public observations at a train station
Blamey, Mutrie, Aitchison (1995)	16 week quasi-experimental	None	22,275 subway users observations

I = intervention; C = control or comparison group.

Intervention	Findings and comments
Written materials, resource manual, weekly fun walks, and activity nights	Participants more active after intervention with movement toward action and low relapse to earlier stage; suggests stage-based community intervention can result in movement toward action; study uncontrolled
I: Screening; lifestyle seminar; exercise programs; newsletters; contests; health communications; no smoking policies C: Screening only	20% of women and 30% of men began vigorous exercise of 2 years
I-1: Health risk appraisal; feedback letter; behavioral management materials; personalized health promotion program I-2: Health risk appraisal; no feedback; full program in year 2 C: No intervention	No difference in physical activity year 1; I-1 greater physical activity in year 2 over I-2
I-1: Fitness facility I-2: Outreach and counseling to high risk employees I-3: Outreach and counseling to all employees C: Health education events	Percent exercising 3 times per week: I-1 = 30%, , I-2 = 44%, I-3 = 45%, C = 37%
I: Heart Week with assessments, health education, weekly community exercise, TV, radio, newspaper community messages C: Not specified	No difference in self-reported physical activity, but intervention community expressed more interest in becoming active; low response rate to surveys (59%); became mainly a media campaign with little community involvement
I: Messages to promote walking and readiness to become active; modeling activity; radio and TV PSAs; T-shirts; special scripting of soap operas	1st campaign—increase in percent who walked for exercise (70% to 74%), greatest impact on 50+ age group (twofold increase in reported walking—not significant) 2nd campaign—small declines in reported walking and in intentions to be more active
I: Sign reading "Your heart needs exercise—here's your chance"	Number of people using the stairs increased from 5% to 14% when sign was up. Use declined to 7% when sign was removed
I: Sign reading "Your heart needs exercise—here's your chance"	Number of people using the stairs increased from 12% to 18%; effect remained for 1 month after sign was removed
I: Sign reading "Stay Healthy, Save Time, Use the Stairs"	Baseline stair use increased to 15–17% when sign was up; persisted at 12 weeks after sign removal; larger increase among men

Table 6-2. *Continued*

Study	Design	Theoretical approach	Population
Special populations: ethnic minorities			
Heath et al. (1991)	2 year quasi-experimental	None specified	86 Native Americans with diabetes
Lewis et al. (1993)	3 year quasi-experimental	Constituency-based model	African American residents of 6 public housing units
Nader et al. (1989) (San Diego Family Health Project)	3 month experimental 9 month maintenance	Social learning theory	623 Mexican and Anglo-American families with 5th grade children
Baranowski et al. (1990)	14 weeks	None specified	94 black families (63 adults, 64 children)
Special populations: persons at risk for chronic disease			
Perri et al. (1988)	18 month experimental	Behavioral management	123 overweight adults
Jeffery (1995)	7 year uncontrolled	None mentioned	280 community members trying to lose weight
King et al. (1989)	2 year experimental	None mentioned	96 men trying to maintain weight loss
Special Populations: older adults			
Mayer et al. (1994)	2 year experimental	Social learning theory	1,800 Medicare beneficiaries in HMO, mostly white, high SES

I = intervention; C = control or comparison group.

Intervention	Findings and comments
I: Exercise class C: Nonparticipants	Participants in the exercise program lost 4 kg of weight on average, compared with 0.9 kg among nonparticipants; improvements occurred in fasting blood glucose levels and medication requirements
I-1: Basic exercise program I-2: Basic exercise program; social; goal setting; attention; information; barrier reduction	Communities that were better organized and had more committed leaders had better program attendance and higher physical activity levels
I: Family newsletter; telephone; mail; personal contact; feedback; family behavior management; physical activity; nutrition education C: Periodic evaluation	No difference in physical activity at 1 year
I: Individual counseling, small group education, aerobic activity, incentives (babysitting, transportation), telephone prompts, assessment C: Assessment only	No difference in energy expenditure; low participation (20%)
I-1: Behavior therapy I-2: Behavior therapy, maintenance I-3: Behavior therapy, maintenance, social influence I-4: Behavior therapy, maintenance, exercise I-5: Behavior therapy, maintenance, exercise, social influence	Difference adherence in high exercise groups at 6 months; no differences at 12 and 18 months; high attrition (24%)
I-1: Diet management I-2: Weight management, including exercise I-3: Physical activity	I-2 resulted in greater weight loss at end, but no differences were observed at 1 year
I: Monthly mailings, advice and tips for coping, staff telephone calls C: No intervention	Men who exercised and received the intervention regained less weight in year 2 than exercisers who did not get the intervention or dieters who were exposed to the intervention
I: Health risk appraisal, feedback, health education sessions, medical tests, immunizations, goal setting, self-monitoring C: Not specified	No change in physical activity (3+ times a week) at 1 year, but 21% vs.14% moved from sedentary to active (no statistical test reported); attrition 16% in experimental group at 1 year

self-monitoring group had significantly better adherence over 12 weeks than those in the self-monitoring plus attention or control groups; however, adherence over the last 6 weeks of the study was significantly better in the self-monitoring plus attention group. Actual differences were not large, amounting to 4 to 5 days of gym attendance over 3 weeks, compared with about 3 days among controls. In all three groups, adherence dropped off most sharply during the first 6 weeks of the study.

Classes, health clubs, and fitness centers are resources to promote physical activity, and numerous studies have been undertaken to improve attendance (Table 6-2). However, many people prefer to exercise on their own. Several studies have used behavioral management techniques to encourage people to do so on their own (Table 6-2). In some studies, training in behavioral management techniques has occurred in a group setting before the participants began exercising on their own; in others, information has been provided by mail. Results have been equivocal. King, Haskell, and colleagues (1995) assigned 50- through 65-year-old participants to one of three conditions: a vigorous, group-based program (three 60-minute sessions); a vigorous, home-based program (three 60-minute sessions); and a moderate, home-based program (five 30-minute sessions). At 1 year, adherence was significantly greater in both home-based programs than in the group-based program. At 2 years, however, the vigorous, home-based program had higher adherence than the other two programs. Researchers hypothesize that it was more difficult for the moderate group to schedule 5 days of weekly physical activity than for the vigorous group to schedule 3 days. Another study encouraged self-monitoring and social support (walking with a partner) and also tested a schedule of calling participants to prompt them to walk. Frequent calls (once a week) resulted in three times the number of reported episodes of activity than resulted from calling every 3 weeks (Lombard, Lombard, Winett 1995). Cardinal and Sachs (1995) randomly assigned 133 women to receive one of the three packets of information promoting physical activity: self-instructional packages that were based on stage of change and that provided tailored feedback; a packet containing a standard exercise prescription; and a packet providing minimal information about health status and exercise status. No significant differences were observed among the three groups at baseline, 1 month, or 7 months.

The advent of interactive expert-system computer technologies has allowed for increased individualization of mailed feedback and other types of printed materials for health promotion (Skinner, Strecher, Hospers 1994). Whether these technologies can be shown to be effective in promoting physical activity at low cost is yet to be determined.

In summary, behavioral management approaches have been employed with mixed results. Where an effect has been demonstrated, it has often been small. Evidence of the effectiveness of techniques like self-monitoring, frequent follow-up telephone calls, and incentives appear to be generally positive over the short run, but not over longer intervals. Evidence on the relative effectiveness of interventions on adherence to moderate or vigorous activity is limited and unclear. Because of the small number of studies, the variety of outcome measures employed, and the diversity of settings examined, it is not clear under what circumstances behavioral management approaches work best.

In a number of studies, methodological issues, such as high attrition rates, short follow-up, small sample sizes, lack of control or comparison groups, incomplete reporting of data, or lack of clarity about how theoretical constructs were operationalized, also make it difficult to determine the effectiveness of behavioral management approaches or to generalize results to other settings or population groups. Stages of change theory suggests that people move back and forth across stages before they become able to sustain a behavior such as physical activity. The relatively short time frame of many studies and the use of outcome measures that are not sensitive to stages of change may have limited the ability to determine if and to what extent possessing behavioral management skills is useful in the maintenance of regular physical activity.

Interventions in Health Care Settings

Health care settings offer an opportunity to individually counsel adults and young people about physical activity as well as other healthful behaviors, such as dietary practices (U.S. Preventive Services Task Force 1996). Approximately 80 percent of the

U.S. population see a physician during a 1-year period (National Center for Health Statistics 1991), but the extent to which physicians counsel their patients to be physically active is unclear. One survey of physicians found 92 percent reporting that they or someone in their practice counseled patients about exercise (Mullen and Tabak 1989), but in a more recent study, only 49 percent of primary care physicians stated they believed that regular daily physical activity was very important for the average patient (Wechsler et al. 1996). Counseling is likely to be brief, often less than 2 minutes (Wells et al. 1986), and ineffective counseling approaches are often employed (Orleans et al. 1985). Physicians may be less likely to counsel patients about health habits if their own health habits are poor (Wells et al. 1984).

Only three studies attempting to improve the physical activity counseling skills of primary care physicians have been reported in the literature; the results suggest small but generally positive effects on patients, with from 7 to 10 percent of sedentary persons starting to be physically active (Table 6-2). One feasibility trial of multiple risk factor reduction—the Industrywide Network for Social, Urban, and Rural Efforts (INSURE) Project—indicates that continuing medical education seminars, combined with reimbursement for prevention counseling and reminders to providers, can increase the percentage of these physicians' patients who subsequently start exercising (Logsdon, Lazaro, Meir 1989). The Physician-based Assessment and Counseling for Exercise (PACE) program incorporated social cognitive theory and the transtheoretical model to individualize brief (2–5 minutes) counseling messages for patients. Compared with patients who did not receive the program counseling, those who did had significantly greater improvements at 4–6 weeks in their reported stage of physical activity readiness, their reported amount of walking for exercise, and their scores from an activity monitor (Calfas et al. in press).

The Canadian Task Force on the Periodic Health Examination (1994) cited insufficient evidence as the reason for not making a recommendation regarding physical activity counseling. However, several other professional organizations have recently recommended routine physical activity counseling. The American Heart Association (Fletcher et al. 1992), the American Academy of Pediatrics (1994), the American Medical Association (1994), the President's Council on Physical Fitness and Sports (1992), and the U.S. Preventive Services Task Force (1989, 1996) all recommend including physical activity counseling as part of routine clinical preventive services for both adults and young people.

In summary, many providers do not believe that physical activity is an important topic to discuss with their patients, and many lack effective counseling skills. The studies that have attempted to increase provider counseling for physical activity demonstrate that providers can be effective in increasing physical activity among their patients. It is not known what alternative approaches to provider counseling can be used effectively in health care settings, although the work of Mayer and colleagues (1994) suggests that well-trained counselors conducting health education classes with patients may help older adults make changes in their stage of physical activity.

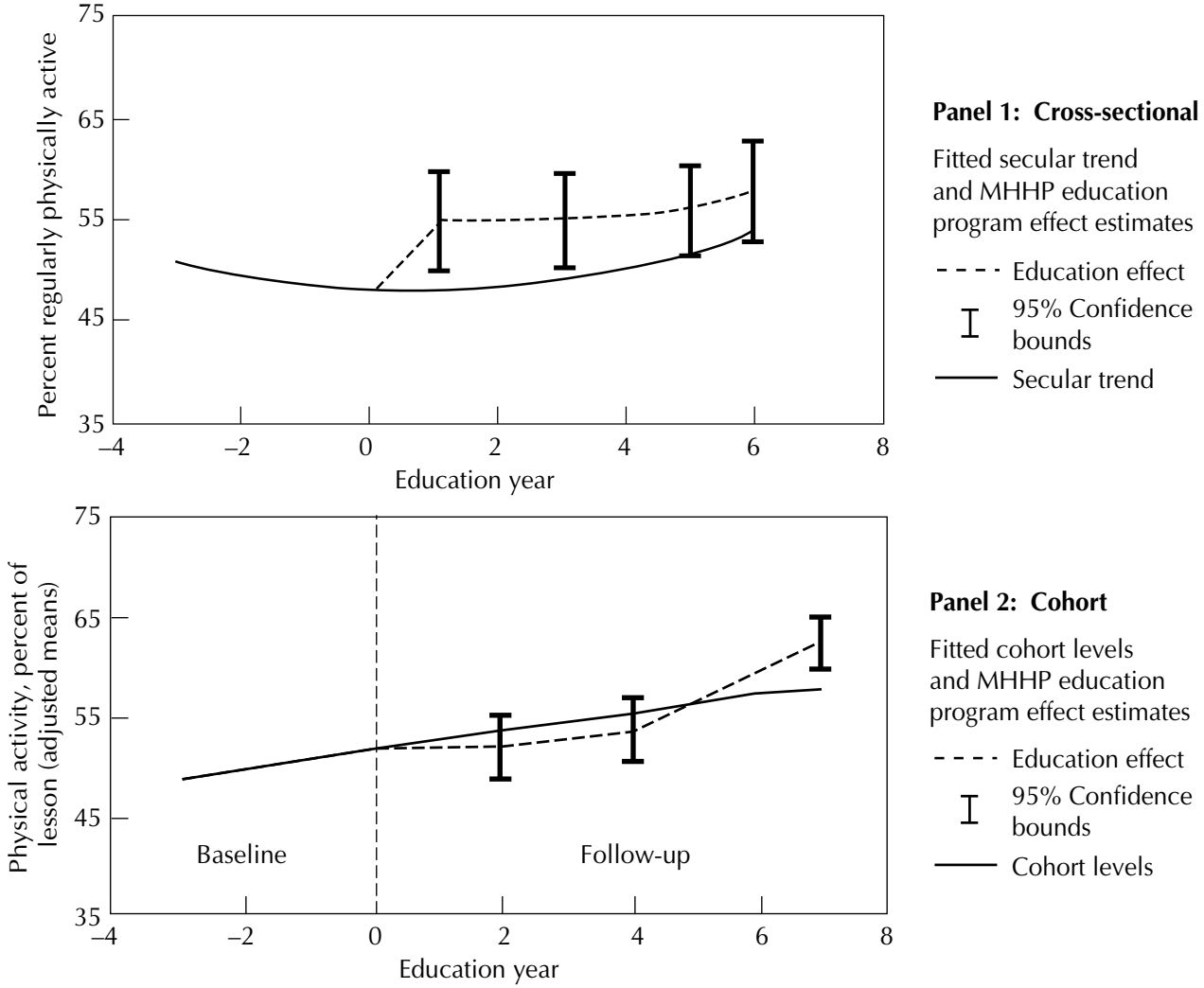
Community Approaches

Communitywide prevention programs have evolved from the concept that a population, rather than an individual, approach is required to achieve primary prevention of disease through risk factor reduction (Luepker et al. 1994). Behaviors and lifestyle choices that contribute to an individual's risk profile are influenced by personal, cultural, and environmental factors (Bandura 1977b). Much of the current knowledge regarding community-based prevention strategies has been gained over the past 20 years from three U.S. research field trials for community-based health promotion—including physical activity promotion—to reduce cardiovascular disease (Table 6-2).

These three trials, which were funded by the National Heart, Lung, and Blood Institute during the 1980s, were the Minnesota Heart Health Program (MHHP) (Luepker et al. 1994), the Pawtucket Heart Health Program (PHHP) (Carleton et al. 1995), and the Stanford Five-City Project (SFCP) (Farquhar et al. 1990). The MHHP advocated regular physical activity as part of its broad effort to reduce risk for CHD in whole communities in the upper Midwest (Crow et al. 1986; Mittelmark et al. 1986). Three intervention communities received a 5- to 6-year program designed to reduce smoking, serum cholesterol, and blood pressure and to increase physical activity; three other communities served as comparison sites. Mass media were used to educate the public about the relationship

between regular physical activity and reduced risk for CHD and to increase opportunities for physical activity. Health professionals promoted physical activity through their local organizations, through their advisory committees on preventive practice, and through serving as role models and opinion leaders. Systematic risk factor screening and education provided on-site measurement, education, and counseling aimed in part at increasing to 60 percent the prevalence of physical activity among the residents in the three intervention communities. The adult education component made available personal, intensive, and multiple-contact programs to increase physical activity; this strategy focused on self-management and included changes in existing behaviors, in the meaning of those behaviors, and in the environmental cues that supported them. Direct education programs for school-aged children promoted physical activity in young people and their parents. The MHHP investigators reported small but significant effects for physical activity in the first 3 years among people in the cross-sectional study group; that effect disappeared with an increasing secular trend in physical activity in the comparison groups. The cohort group (followed over time) showed no intervention effect until the last follow-up survey (Figure 6-1).

Figure 6-1. Results of the Minnesota Heart Health Program on physical activity. Graph compares the percentage of respondents reporting regular physical activity in intervention cities and the secular trend estimated from control cities



Source: Luepker RV et al. *American Journal of Public Health* 1994 (reprinted with permission).
Note: Adjusted for age, sex, and education.

The PHHP fostered community involvement in heart healthy behavior changes in Pawtucket, Rhode Island (Carleton et al. 1995). The focus was on grassroots organizing, volunteer delivery, and partnerships with existing organizations rather than on using electronic media (Lasater et al. 1986). In the area of physical activity promotion, the emphasis was on environmental and policy change through partnerships with city government and others. Working with the Department of Parks and Recreation, the PHHP was instrumental in establishing cardiovascular fitness trails in both of the city's parks. Early in its existence, the PHHP also helped that department place on the ballot and pass a large bond issue in return for renovations (e.g., lights, fencing to keep stray dogs out, resurfacing) to an existing quarter-mile track for walking. The Pawtucket 6-week Imagine Action Program, designed around the stages of change model, enrolled more than 600 participants, who subsequently reported being more active as a result of the program (Marcus, Banspach, et al. 1992). Results of this uncontrolled study suggest that a stage-based approach may be effective in moving people toward regular physical activity.

The SFCP included two intervention and two comparison communities in northern California (only morbidity and mortality data were monitored in the fifth city, and those results were not reported in this study). This project was designed to increase physical activity and weight control and to reduce plasma cholesterol levels, cigarette use, and blood pressure (Farquhar et al. 1990). Greater emphasis was placed on nutrition, weight control, and blood pressure than on physical activity. The program used concepts from social learning theory, diffusion theory, community organization, and social marketing in combination with a communication and behavior change model (Flora, Maccoby, Farquhar 1989). The program relied heavily on the use of electronic and print media for the delivery of health education information. General education was supplemented by four to five annual education campaigns targeting specific risk factors. Direct face-to-face activities included classes, contests, and school-based programs (Farquhar et al. 1990). Overall, the educational intervention had no significant impact on physical activity levels, knowledge, self-efficacy, or attitudes toward physical activity (Young et al., in press). In the cross-sectional sample, men in the experimental communities were significantly more likely than those in the control communities to engage in at least one vigorous activity. For women in both the cross-sectional and cohort studies, a small but significant increase was observed in the number of moderate activities engaged in (Young et al., in press).

Among smaller-scale community studies, the results of efforts to promote physical activity have been mixed (Table 6-2). One exception was the community-based cardiovascular disease prevention program aimed at black residents in rural communities in the Missouri "Bootheel" (Brownson et al. 1996). In this 5-year, low-cost intervention project, educational efforts were combined with environmental changes. Local coalitions formed walking clubs, built walking trails, started exercise classes in churches, and organized special events to promote both physical activity and good nutrition. Although no difference in levels of physical inactivity was observed between the Bootheel and the rest of the state at follow-up, physical inactivity declined an average of 3 percent in Bootheel communities that had coalitions and increased an average of 3.8 percent in those without, for a net improvement of 6.8 percent.

In summary, results of community-based interventions to increase physical activity have been generally disappointing. Measurement of physical activity has varied across studies, making comparisons difficult. The presence of active community coalitions, widespread community involvement, and well-organized community efforts appear to be important, however, in increasing physical activity levels.

Worksite Programs

Physical activity programs conducted on the worksite have the potential to reach a large percentage of the U.S. population (Bezold, Carlson, Peck 1986; National Center for Health Statistics 1987). As settings for physical activity promotion, many worksites have easy access to employees and supportive social networks and can make changes in the environment to help convey physical activity as an organizational norm (Shephard, in press).

The proportion of worksites offering physical activity and fitness programs has grown in recent years, from 22 percent in 1985 to 42 percent in 1992 (Table 6-3). For two groups of employers, those with 50–99 employees and those with 100–249

Table 6-3. Summary of progress toward *Healthy People 2000* objective 1.10

"Increase the proportion of worksites offering employer-sponsored physical activity and fitness programs as follows:"

Year 2000 objective	1985	1992	Year 2000 target
Physical activity and fitness worksites with:			
50–99 employees	14%	33%	20%
100–249 employees	23%	47%	35%
250–749 employees	32%	66%	50%
750+ employees	54%	83%	80%

Source: U.S. Department of Health and Human Services, 1992 National Survey of Worksite Health Promotion Activities, 1993.

employees, the percentage with exercise programs more than doubled over that time period. In each worksite size category, the percentage with exercise programs had already (i.e., in 1992) exceeded the year 2000 national objective for worksite health promotion listed in *Healthy People 2000* (USDHHS 1993). Generally, the extent of participation, effectiveness, and quality of those programs is unknown, for only a few worksite physical activity programs have been evaluated (Table 6-2).

In the Johnson & Johnson Live for Life program (Wilbur 1983), employees at four experimental sites participated in lifestyle seminars, contests, and exercise programs and received newsletters on health issues and other health communications. Experimental and control sites both received an annual health assessment. Overall, at the end of 2 years, 20 percent of women and 30 percent of men in the experimental sites reported beginning a vigorous exercise program; the prevalence at three comparison sites was 7 percent for women and 19 percent for men (Blair et al. 1986).

Fries and associates (1993) evaluated the effectiveness of a health promotion program that included physical activity for Bank of America retirees. In one intervention group, each participant paid $30 for a personalized, mail-delivered program that included a health risk appraisal and behavioral management books and other materials. A second group received a risk appraisal and nothing else for the first 12 months, after which it received the full intervention. A control group was monitored for claims data only. The first intervention group did not differ from the second in self-reported physical activity at the end of year 1 but was significantly different in year 2.

Worksite programs less often attract sedentary, blue-collar, or less-educated employees, but interventions that are tailored to these persons' needs and interests (King, Carl, et al. 1988) and provide counseling and peer support (Heirich et al. 1993) show promise. In a controlled study, Heirich and colleagues (1993) compared different programs at four automotive manufacturing plants of like size and employee populations. The three approaches tested were 1) a staffed physical fitness facility, 2) one-to-one counseling and outreach with high-risk employees (i.e., those who had hypertension, were overweight, or smoked cigarettes), and 3) one-to-one counseling and outreach to all employees, peer support, and organizational change (e.g., the institution of nonsmoking areas). The fourth site, which served as a control, offered health education classes and special events. After 3 years, exercise prevalence at the four sites was lowest at the plant with the exercise facility . In the two counseling and outreach sites, nearly half of the employees reported exercising 3 times a week.

In summary, considerable progress has been made in meeting the *Healthy People 2000* goals for worksite physical activity programs. Too few studies exist to clearly determine what elements are required for physical activity programs at work to be effective in increasing physical activity levels among all employees, attracting diverse employee groups (such as blue-collar workers), or maintaining exercise levels

over time. However, the limited research available suggests that widespread employee involvement and support coupled with organizational commitment evidenced by the presence of policies and programs may be important factors in increasing levels of physical activity. Existing controlled studies have been done in larger worksites; studies have not yet shown what might work in smaller worksites and in diverse worksites (e.g., where many employees travel or facilities may not exist).

Communications Strategies

Communications strategies, both electronic and print, have the potential for reaching individuals and communities with a rapidity unmatched by other intervention strategies. For the general population, media can play several roles: to increase the perceived importance of physical activity as a health issue, to communicate the health and other benefits of physical activity, to generate interest in physical activity and awareness about available programs, to provide role models for physically active lifestyles, and to provide cues to action, such as getting people to request further information on physical activity, visit an exercise site, or begin exercising (Donovan and Owen 1994).

The effectiveness of different forms of media alone, including broadcast and print media, for promoting either initial adoption or subsequent maintenance of physical activity remains unclear because the few systematically evaluated interventions employing communications strategies have shown mixed results (Osler and Jespersen 1993; Booth et al. 1992; Owen et al. 1995; Luepker et al. 1994; Farquhar et al. 1990). The SFCP, discussed earlier, resulted in small increases in the number of moderate activities engaged in by women and vigorous activity engaged in by men. Two national mass media campaigns to increase physical activity, particularly walking, to prevent cardiovascular disease were conducted in Australia in 1990 and 1991 (Booth et al. 1992). Drawing on social marketing and social learning theories, both campaigns included paid advertisements on national television, public service announcements on radio, scripted episodes on two nationally broadcast television dramas, posters and leaflets, stickers, T-shirts and sweatshirts, magazine articles, distribution of a professional article, soap operas specially scripted to feature physical activity, and publicity tours by two experts in heart health. The budgets and paid television coverage for the 1990 and 1991 campaigns were similar. Both campaigns were evaluated by one-on-one, home-based interviews with structured cross-sectional random samples of approximately 2,500 people 2 weeks before and 3 to 4 weeks after each campaign. Both campaigns resulted in significant differences in message awareness (46 percent vs. 71 percent in 1990; 63 percent vs. 74 percent in 1991). The 1990 postcampaign survey revealed significant increases in walking for