

Determinants of Physical Activity in Adolescents and Young Adults: The Basis for High School and College Physical Education to Promote Active Lifestyles

Markus V. Nahas, Bernie Goldfine, and Mitchell A. Collins

Abstract

The objective of this paper is to provide an overview of factors that influence physical activity adoption and/or maintenance for high school and college students (ages 15-24) based upon the recent behavioral research literature. Regardless of one's age, adoption and maintenance of physical activity is a complex process, reflective of multiple personal, interpersonal, and environmental variables. A more complete understanding of this topic requires familiarity with behavioral change theory. As a backdrop to the behavioral research concerning physical activity, a variety of behavioral change theories are discussed including classic Learning Theories, the Health Belief Model, Social-Cognitive Theory, the Transtheoretical Model (also referred to as the Stages of Change Model), and a variety of Ecological Models. Regarding the adoption and maintenance of physical activity by high school students, the Youth Physical Activity Model proposed by Welk (1999) provides a clear framework for understanding this behavior and for guiding interventions. In addition to the theoretical underpinnings of physical activity behavior, various determinants of activity are discussed, including demographic and biological factors; psychological, cognitive, and emotional factors; behavioral attributes and skills; social and cultural factors; physical environment

factors; and physical activity characteristics. Furthermore, the determinants that promote physical activity (facilitators) and the factors that are perceived as discouraging physical activity (barriers) are explored. A summary of some of the research findings regarding physical activity behavior promotion in school settings through physical education programs is presented. Additionally, strategies for behavior modification aimed at increasing physical activity are delineated.

Introduction

Health promotion is strongly associated with personal lifestyles and involves two main processes: stopping negative (unhealthy) behaviors (such as smoking, alcohol consumption, or sedentary behaviors) and starting positive behaviors (such as regular exercise, good dietary practices, or sunscreen use). Changing behavior, however, is not an easy task. Health-related behavior change involves an array of factors and is a dynamic process with frequent transitions between the several stages that exist from the current status to the expected behavior (for example, the change from a sedentary life to a physically active one).

Physical activity is widely recognized as an important behavioral characteristic for health promotion and disease prevention (Bouchard & Shephard, 1994; Pate et al., 1995; US Department

of Health and Human Services, 1996). A large portion of the population, however, is not active enough to obtain these health benefits, and among those who begin an exercise program, 50% tend to drop out after the first three to six months (Dishman, 1993). Depending on the definition of "sedentary," studies indicate that between 30% and 60% of the adult population in most industrialized countries are considered sedentary during leisure time (Dishman, 1993). Nearly two-thirds (60%) of U.S. adults report irregular patterns of leisure-time physical activity, while close to one-third (30%) report no leisure-time physical activity at all (US Department of Health and Human Services, 1996).

Despite the abundance of information that demonstrates the role of physical activity in health and quality of life, this information alone has not been sufficient to promote active lifestyles among the majority of the population. In general, people do not exercise just because scientific evidence indicates that they should. Also, it appears that the traditional sports-centered physical education curricula, aggravated by the decreasing time allocated to such programs, are not effective in promoting active lifestyles (Dale & Corbin, 2000). There is clear evidence that physical activity patterns can be changed (Sallis & Owen, 1999), but the best approach for promoting such changes or predicting the extent of those changes is difficult to determine.

In addition, the operational definitions of physical activity vary greatly. Some factors that complicate a clear understanding of physical activity are the nature and purpose of the activity (leisure, household, work, transportation), the intensity of the activity (light, moderate, vigorous), and the cognitive processes involved in recalling one's behavior. The current measurement devices appear not to be valid, sensitive, or practical enough for large groups or population studies. It is now clear that the term physical activity and its determinants may vary if it is defined as a free-time leisure activity or as

supervised programs, identified by the type and intensity of exercise (Dishman, 1994), and related to the adoption or maintenance of such behavior (Marcus, Rossi, Selby, Niaura & Abrams, 1992).

Behavioral scientists and physical activity professionals are currently facing two major challenges: (1) how to get inactive people to initiate physical activity, and (2) how to get irregularly active people to become active on a regular basis and maintain a consistent level of activity. Evidence suggests that the key to behavior change lies beyond mere information or compulsive sports practice and is highly dependent on individual motivation, social support, and environmental conditions (including the availability of facilities and the physical activity characteristics).

In order to provide motivation for individuals to change their sedentary behaviors, it is necessary to understand the determinants of such behaviors. Developing effective population interventions requires strategies and behavioral techniques that have proven effective on an experimental and clinical basis. It has also been demonstrated that different groups (e.g., women, the elderly, children, teen-agers and young adults, blue-collar workers, and handicapped people) require specific intervention approaches. Also, some individuals will likely not be ready to initiate a new behavior. This is particularly important because, traditionally, interventions to promote physical activity have begun with the assumption that the majority of people were ready for action, which is not the case for many subgroups within the general population.

The objective of this paper is to provide an overview of the factors that influence physical activity adoption and/or maintenance for high school and college students (i.e., members of the population ranging from, roughly, 15 to 24 years of age), based upon recent behavioral research literature which contains various theoretical explanations for these behaviors. Successful interventions and strategies to promote physical activity in high school and college are briefly

discussed, and practical suggestions to facilitate changes through physical education initiatives are presented.

Changing Physical Activity Behavior: Theoretical Background

Theoretical models help explain how physical activity (including exercise) behaviors can be influenced. From these theories, strategies can be derived to facilitate the adoption of more active lifestyles, such as (a) helping people find more benefits than barriers; (b) increasing self-efficacy (perceived competence) specific to physical activity; (c) increasing self-regulatory skills, such as self-monitoring and goal setting; (d) increasing social-support; (e) increasing positive feelings toward exercise; and (f) learning how to restructure thoughts in relation to exercise.

Several theories have provided possible explanations for behavioral changes. Most of the research in this area has been associated with smoking, drug use, and dietary behavior; however, physical activity has received more attention in recent years in the wake of scientific evidence linking it to reduced all-cause mortality and reduced risk of disease (US Department of Health and Human Services, 1996). Although the benefits of physical activity are becoming increasingly apparent, the knowledge of these benefits alone has not motivated the population in general to adopt and maintain regular physical activity, likely because the adoption and maintenance of regular physical activity is a complex process, reflective of multiple influencing intrapersonal, interpersonal, and environmental variables.

In order to facilitate understanding of physical activity behavior, a summary of the evolution of the major theories in this field is provided. For those interested, a more detailed description of these theories can be found elsewhere (Dishman & Sallis, 1994; Glanz & Rimer, 1995; US Department of Health and Human Services, 1996; Sallis & Owen, 1999).

The classic *Learning Theories* are focused on the individual, emphasizing that incorporating a new behavior (such as regular exercise) would require a progressive modification of small behaviors, from simple to complex patterns. Reinforcement is considered an important element in this model, as well as incentives, such as the physical consequences (losing weight, looking better), the extrinsic rewards (encouragement from friends or relatives, receiving a small token or appreciation for reaching a goal), and intrinsic rewards (a feeling of accomplishment, personal satisfaction) (US Department of Health and Human Services, 1996).

The *Health Belief Model*, one of the oldest theories in this area, contends that health-related behaviors depend on an individual's perception of the severity of a potential illness and the person's susceptibility to that illness along with the perceived benefits and barriers related to preventive actions (Becker and Maiman, 1975). Although the Health Belief Model has been applied in the promotion of several health-related behaviors, attempts to increase physical activity have yielded little success. Dishman (1994) contends that the more likely explanation for the problems with this model is related to the fact that people have a diverse array of motives for being physically active. For most people, the perceived threat of a disease is not one of the major motivations for exercising.

The *Social-Cognitive Theory* (initially referred to as the *Social-Learning Theory*), proposed by Bandura (1977; Bandura 1986), stipulated that personal factors, environmental influences, and attributes of the behavior affect behavior change itself. According to Bandura, these factors may also influence one another, and in order to change behavior, a person must feel competent to perform the behavior (i.e., the person must have positive *self-efficacy*, a central concept in this theory). This concept has been consistently and positively associated with physical activity and will be discussed in more detail in the next section when the concept of self-efficacy is discussed.

The *Transtheoretical Model* (also called the *Stages of Change Model*) was initially proposed by Prochaska and DiClemente (1982) and later applied to exercise behavior by Prochaska and Marcus (1994). This model suggests that individuals change behaviors, such as smoking or a sedentary lifestyle, by moving through a series of stages that represent their readiness to change. It includes a five-stage process of behavioral change: (1) precontemplation, (2) contemplation, (3) preparation, (4) action, and (5) maintenance. Behavioral changes will be more successful, this model contends, if a person's stage of change is considered and the right processes (interventions) are invoked. This model has been used in several interventions to promote physical activity, based on the supposition that people must move through the early stages where motivation and commitment are developed before taking action and changing the behavior (Marcus, Rossi, et al., 1992).

Recently, more attention has been paid to sociocultural and physical environmental influences on behavior. New approaches for promoting physical activity consider the need of supportive environments for individual changes to occur. These models, called *Ecological Models*, reflect the evidence that the most effective interventions occur on multiple levels. Simmons-Morton and colleagues (1988) proposed a model with three levels (individual, organizational, and governmental) in four settings (schools, worksites, health care institutions, and communities), which should be considered in future interventions to promote physical activity. In this social-ecological approach (Sallis, Grossman, Pinski, Paterson & Nader, 1987; Stokols, 1992), major variables to be considered in physical activity promotion are: (a) Individual perceptions: outcomes, barriers, behavioral control (self-efficacy); (b) Social influences and social support; and (c) Physical environment and policy.

Welk (1999) presented a broad-based, social-ecological conceptual model to understand

physical activity behavior and guide interventions in youth, following the *Precede-Proceed Health Promotion Planning Model* proposed by Green and Kreuter (1991). This model suggests that there are multiple levels of environmental influences (e.g., social, cultural, physical, institutional) that can directly and indirectly influence behavior (Welk, 1999), thereby acknowledging that self-regulation needs a broader social and institutional support. The model was validated using structural equation modeling techniques and was found to predict 43% of the variance in physical activity (Welk, 1999). Figure 1 is a representation of this model, with the arrows indicating the direction of significant effect.

Concerning the application of these theories, a single theory or a combination of different models and theories may be appropriate to achieve specific physical activity goals, depending upon the setting (i.e., individual, school, community, etc.) (Sparling, et al., 2000). It appears that the Transtheoretical Model is the most germane for increasing physical activity, as revealed in recent studies, because of its sound reasoning, utility, and applicability (Cardinal, 1997; Nigg & Courneya, 1997).

Determinants of Physical Activity

Determinants refer to those factors that influence behavior. They may be biologically determined, or they may exist in the physical or social environment in which we live. In general, determinants can be characterized as *facilitators* (those that promote physical activity or reduce sedentary behaviors) and *barriers* (those that are perceived as discouraging behavioral change). Examples of facilitators are the availability of good facilities and an individual's level of confidence in the performance of specific activities, while lack of time, distance to facilities, and cost of supervised programs are examples of perceived barriers. Research has shown that determinants may vary in relation to type and intensity of exercise in supervised programs and

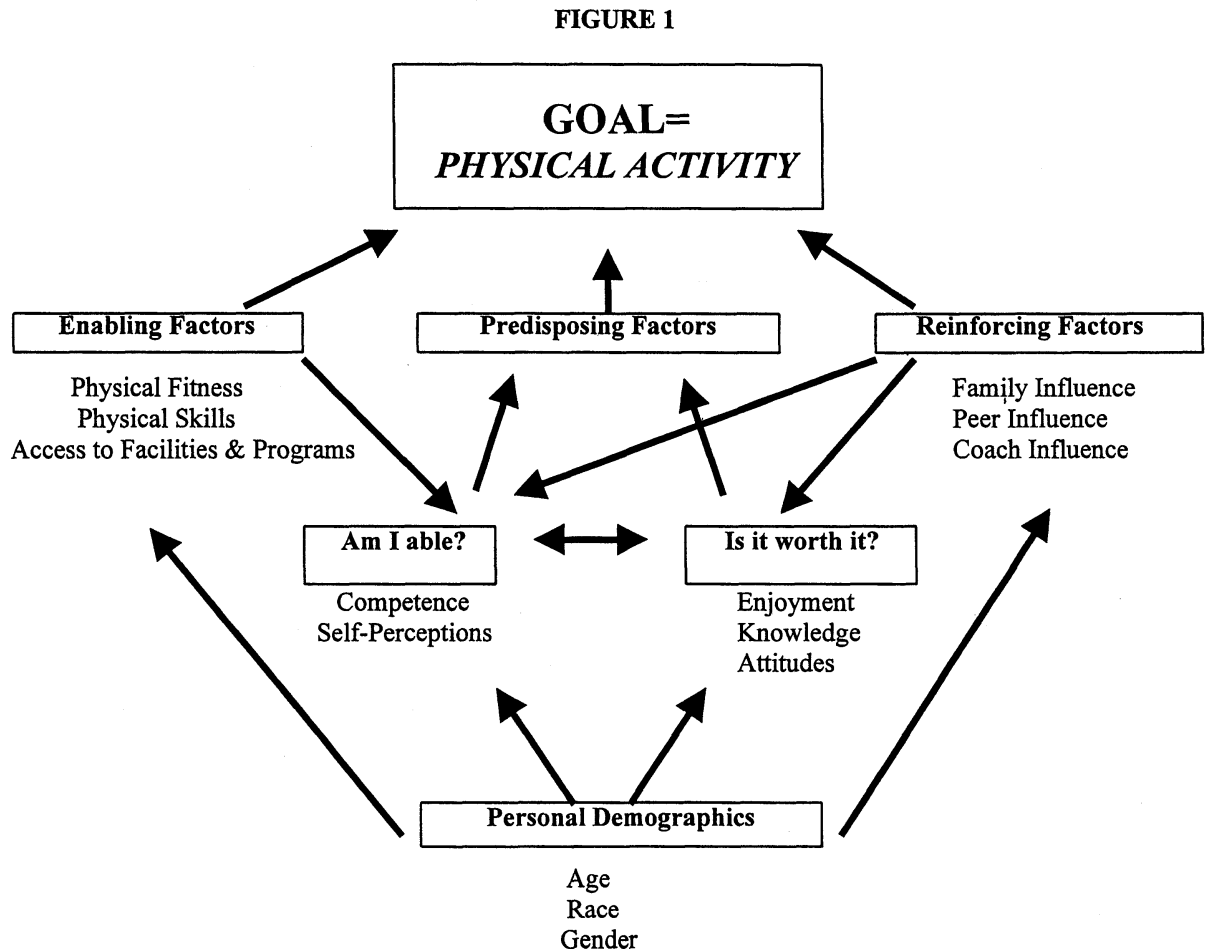


Figure 1. Youth Physical Activity Model (Weik, 1999).

in overall daily physical activity (Sallis & Owen, 1999).

Sallis and Owen (1999, p. 115) categorize the theoretical variables considered to be determinants of physical activity, such as (a) *Demographic and biological factors*; (b) *Psychological, cognitive, and emotional factors*; (c) *Behavioral attributes and skills*; (d) *Social and cultural factors*; (e) *Physical environment factors*; and (f) *Physical activity characteristics*.

A similar classification considers four groups of determinants of physical activity behavior.

Some of them are modifiable, while others are biologically established or difficult to change. (1) *Personal Characteristics*—age, sex, education, working characteristics, past and present experiences, smoking status, Body Mass Index, health status. (2) *Psychological and Behavioral Determinants*—self-efficacy, intention to be active, enjoyment, self-motivation, perceived barriers, stage of change. (3) *Environmental Determinants* (Social and Physical)—social support from friends and relatives, availability of facilities, cost, climate, safety. (4) *Physical*

Activity Characteristics—activity intensity, type, perceived effort.

Most psychological and environmental factors are modifiable through intervention; therefore, those psychological and environmental determinants that are most relevant to high school and college physical education are discussed in more detail below.

Self-Efficacy

The concept of self-efficacy, as derived from Bandura's Social Cognitive Theory (1986), is suggested to be a powerful predictor of behavior. Self-efficacy beliefs are closely tied to success in performing behaviors such as smoking cessation, weight loss, and exercise (Marcus, 1995). According to this theory, confidence in one's ability to perform a given behavior is strongly related to the actual ability to perform that behavior.

Specifically in the area of physical activity, self-efficacy represents perceptions of personal efficacy or confidence regarding one's ability to be active on a regular basis. Sallis and Owen (1999) define self-efficacy as "a person's confidence in his or her ability to do specific physical activities in specific circumstances" (p. 117). Therefore, a person may report different levels of self-efficacy for different activities or conditions in which the activity is to be performed.

Self-efficacy has been highly correlated with physical activity, particularly vigorous activity, such as jogging/running, swimming laps, playing soccer or basketball, which have an energy requirement of 6 METs or more, in cross-sectional studies (Sallis, Hovell & Hofstetter, 1992), and it is one of the strongest predictors of future activity. It has been useful in predicting activity levels among adolescents (Reynolds et al., 1990) and adults of all ages (King et al., 1992; McAuley, 1994; Sallis, Simons-Morton, et al., 1992).

Measuring self-efficacy, like measuring any other psychological construct, is a complex task.

Sallis and colleagues (1988) developed and validated the *Self-Efficacy for Exercise Behaviors Scales*, which is applicable to young adults (up to 45 years of age). This instrument includes two main factors: (1) resisting relapse (items 1-5) and (2) making time for exercise (items 6-12). It has been validated and widely used in the U.S. population (Sallis et al., 1988).

Intentions

Ajzen's Theory of Planned Behavior (Figure 2) proposed that intention is the primary determinant of behaviors under personal control, including most types of physical activity (Sallis & Owen, 1999). Godin (1994) found positive correlations (intention x exercise) in 12 studies varying from $r = .19$ to $.82$, which provides support for the theory.

Perceived Barriers

Several investigations have reported that a person's perceived barriers to exercise are an important determinant of how active he or she becomes (Brawley, Martin & Gyurcsik, 1998). Perceived barriers to health-promoting behaviors, along with perceived benefits, are two of the determinants in the Health Promotion Model proposed by Pender (1987). The term *barrier* can also be interpreted as *cons* in the decision balance framework (Sallis & Owen, 1999). Research has shown that, objectively or subjectively, reported barriers have a strong and consistent correlation with exercise (Sallis & Owen, 1999).

Some perceived barriers are of a *personal* nature—such as depression or fatigue—that can slow or stop health behaviors; others are *situational*, such as workload or bad weather. Barriers may also consist of *physical* factors that inhibit the behavior, such as lack of facilities, transportation, or competent instruction (Brawley, Martin & Gyurcsik, 1998).

In most studies, the principal reason given by people for not being active is *lack of time* (Dishman & Sallis, 1994). Sallis and Owen (1999) contend that "*lack of time*" may also fall

FIGURE 2

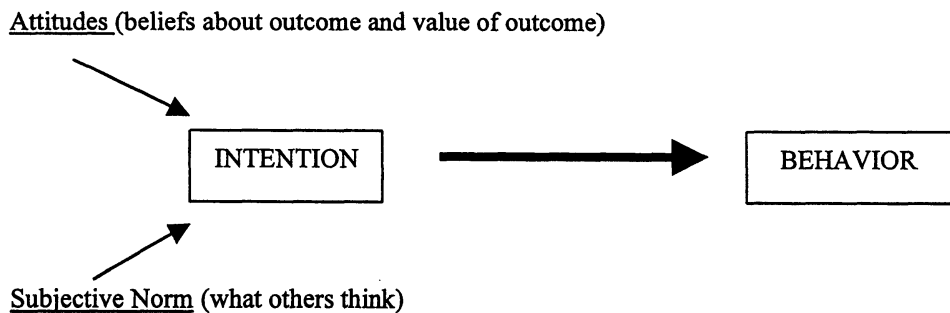


Figure 2. Ajzen's Theory of Planned Behavior Model.

under the category of “convenient excuses” for not being physically active. Convincing evidence that “lack of time” is merely a convenient excuse is the fact that watching television is by far the most popular American pastime, with the average adult in the U.S. watching four hours of television per day (Edginton, Jordan, DeGraaf & Edginton, 1995). Thus, Americans spend at least half their free time in front of a television. By the age of 70, this viewing time amounts to seven full years out of an approximate forty-seven possible waking years that the average U.S. adult has spent watching television. Researchers also estimate that by the time a student completes high school, he or she will have spent more time watching television than attending school (Dietz & Gortmaker, 1985). Despite the number of hours individuals log in front of the television, their reported lack of time is attributed to work, school, or household/child-care activities. Identifying the reasons for the reported lack of time is important for research and intervention purposes because men and women have different reasons for lack of time.

Besides lack of time (the number one perceived barrier), other barriers mentioned by women include lack of money, lack of facilities, lack of partner, and the perception of exercise as boring

(also referred to as lack of enjoyment, which will be discussed separately).

Sechrist et al. (1987) cite the following major perceived barriers to exercise in adults: lack of spouse or family support (also referred to as a social support variable), inaccessibility or inconvenient schedules of facilities, lack of time due to work or family responsibilities, and the cost of an exercise program. Other barriers mentioned by the subjects in this study include “too embarrassed to exercise, people in exercise clothes look funny, and exercise is tiring/hard work.” These authors developed the Exercise Benefits/Barriers Scale (EBBS), an instrument with 43 items, with the possible range of scores from 43 to 172 (4-item Likert scale), which can be utilized in Physical Education settings.

A study with college students and alumni (Calfas, Sallis, Lovato & Campbell, 1994) found that the major barriers associated with physical activity were aversiveness of physical activity, inconvenience, worries, and competing demands. Worries associated with stressful life events are considered strong barriers to physical activity and should receive special attention during the university years and beyond. As Sallis and Owen state: “if the barriers are objective, methods for changing the social and physical environment are

needed. If the barriers are more subjective, intervention components to help participants refute these beliefs or think about them less often may be useful” (p.120). Meanwhile, an instrument to measure perceived barriers in young people was developed by Sechrist, Walker, and Pender (1987).

Enjoyment

Enjoyment is a construct in the affective domain considered by some researchers as essential to exercise adherence. The way people perceive enjoyment, however, seems to be diverse and multidimensional, making this construct a

complex one to use as a process variable for behavior change (Kimiecik & Blissmer, 1998). Perhaps for this reason, very few instruments to assess enjoyment have been developed based upon good theoretical background.

One well-known instrument intended to measure enjoyment is the PACES (Physical Activity Enjoyment Scale), developed by Kendzierski and DeCarlo (1991). This 18-item instrument asks respondents to rate how they feel immediately after an acute physical activity bout. It uses a semantic-differential scale, with seven levels between the extremes. See example in Table 1.

Table 1. Example of the 7-level semantic-differential scale used to measure enjoyment.

I enjoy it	1	2	3	4	5	6	7	I hate it
I feel bored	1	2	3	4	5	6	7	I feel interested
I dislike it	1	2	3	4	5	6	7	I like it
etc.								

Stages of Change

The concept of stages is part of the Transtheoretical Model of Behavior Change. Stages can be very useful in the behavior change process because this construct is very easy to understand, most professionals can easily assess it, and it is very objective in placing people into certain categories (stages).

Prochaska and Marcus (1994) define the stages as being somewhere between traits and states, meaning stages can be both stable and dynamic in nature: “Although stages may last for

considerable periods of time, they are open to change. This is the nature of most risk behaviors—stable over time yet open to change” (p. 162).

Included in Table 2 is the classification scheme used by Prochaska and Marcus (1994).

Social Support

Many studies have found a significant association between physical activity and social support from family, friends, and program staff in supervised settings (Sallis & Owen, 1999). Social

Table 2. Classification scheme used by Prochaska and Marcus (1994).

The *Stages of Change Model* applied to moderate* or vigorous** physical activity:

- ▶ Precontemplation – Not active and not intending to be active in the next six months
- ▶ Contemplation – Not active but intending to start in the next six months
- ▶ Preparation – Irregularly active, but intending to become regularly active in the next 30 days
- ▶ Action – Regularly active for less than six months
- ▶ Maintenance – Regularly active for longer than six months

* Moderate physical activity (3-6 METs) – defined as 30 minutes of activities (e.g., brisk walking, bicycling, or working in the yard) accumulated in 5 or more days per week.

** Vigorous physical activity (6+ METs) – defined as 20 minutes of activities intense enough to produce sweat and make you breath harder (e.g., jogging playing basketball, or swimming laps) performed 3 or more times per week.

support is considered an interpersonal variable that can influence behavior directly or indirectly. Direct support relates to situations such as exercising together or doing home tasks (like taking care of children, cleaning the house for the spouse to exercise). Indirect support can be just talking or encouraging a friend or family member to be more active (Sallis et al., 1987). A two-year population study including men and women (Sallis et al., 1992) demonstrated that both friend and family support were associated with increased physical activity. A measure of Social Support for Exercise was developed by Sallis et al. (1987).

Research in Physical Education School Settings

An examination of the means for promoting lifelong physical activity through the school

settings (from pre-kindergarten through college) reveals there are no unequivocal theories or definitive guidelines for how to accomplish this goal. More research is necessary to ascertain the approaches that will work best with each age group. However, some general guidelines can be derived from the work of Corbin (1994), Pate and Hohn (1994), and Sallis (1994):

- ▶ The program should focus on teaching activity and behavioral skills that promote generalization and maintenance of physical activity during youth and that enhance the probability of carryover to adulthood.
- ▶ Curricula should be appropriate to the developmental stage and cultural aspects of the students.

- ▶ Teachers and student teachers need education and support in the use of physical education curricula that promote lifetime physical activity.
- ▶ Physical environment (open spaces, trails, stairs, sports facilities) and policy must be considered for more successful physical activity promotion in schools and colleges.

Findings with programmatic implications for physical education courses relative to high school and college students include the following:

- (a) The Surgeon General's Report on Physical Activity and Health (US Department of Health and Human Services, 1996) documents the decline of physical activity during adolescence and establishes that promoting physical activity among youth is an important national concern.
- (b) High school students can develop better attitudes and increase their levels of habitual physical activity following one semester or one year of conceptual physical education (Killen et al., 1988; Goldfine & Nahas, 1993).
- (c) The Project *Active Teens* has shown that high school students exposed to conceptual rather than traditional, sports-centered programs are more likely to meet adolescent guidelines for physical activity (Dale, Corbin & Cuddihy, 1998; Dale & Corbin, 2000). Additionally, females exposed to this type of physical education are significantly less likely to report sedentary behaviors.
- (d) Brynteson and Adams (1993) found that conceptual physical education courses were effective in promoting positive attitudes toward physical activity and positive changes in physical activity behaviors.
- (e) University-age women appear to benefit from gaining knowledge of

the benefits of physical activity when combined with learning behavioral change skills in terms of increased physical activity during their free time (Sallis & Owen, 1999).

Research has been limited in the area of promoting physical activity behavioral changes through physical education, and only recently the Stages of Change Model and the use of behavioral strategies have been introduced to the interventions to promote active lifestyles through high school and college physical education. Earlier theories such as the Health-Belief Model (i.e., the idea that one will adopt healthier behaviors just because he/she becomes aware of the health benefits) have less relevance to today's physical educators because it is now known that information alone is not enough to promote behavior change. Furthermore, the mandatory practice of formal sports does not work with those who are not skilled in such modalities (the majority of people in school). Therefore, physical educators must be open to suggestions from students and society at large and should be more cognizant of the research findings that guide successful interventions for educational and public health purposes.

In order to be effective in promoting physical activity among students at the high school and college levels, physical education needs to evaluate its curriculum and professional preparation in conjunction with the theoretical models and strategies proven to work in different settings. At the same time, requirements for quality physical education in middle and high school need to be increased and classroom ratios must be manageable to enable instructors to employ individual behavior change strategies such as those based upon the Transtheoretical Model; furthermore, colleges should offer attractive conceptual and applied courses that implement behavioral change strategies based upon theories such as the Transtheoretical Model.

Physical education teachers must realize that students are not all in the same stage of behavior change, and must consider some individualization in their programs.

Concluding Remarks and Suggestions

The following suggestions for improving the effectiveness of high school and college physical education programs are based upon two major theoretical constructs: the Social-Cognitive Theory and the Transtheoretical Model. Additionally, these ideas parallel the Centers for Disease Control and Prevention's "Guidelines for School and Community Programs to promote lifelong physical activity among young people," which emphasizes the importance of social support and environmental considerations. (USDHHS, 1999).

Kimiecik and Blissmer (1998) proposed a series of questions assessing psychological constructs that could be used in a practitioner/client exercise behavior consultation. This questionnaire provides the professional a quick view of the client's behavioral characteristics, allowing for a more successful orientation. The following grid (Table 3) has been adapted from these authors and may be used in educational settings as well (p. 456).

It is well known that to be successful in changing physical activity behaviors, one must go beyond merely providing information. At the individual level, it is necessary to use specific strategies to help a person initiate and adhere to an active lifestyle. Also, the opportunity for practicing the incorporation of physical activity must be taken into consideration or the expected changes will not materialize.

Physical education teachers have a tremendous opportunity to help students change health-related behaviors. The following are examples of opportunities and strategies for behavior modification to increase physical activity involvement in high school or college classes:

Developing Self-Regulatory Skills:

- ▶ Goal-setting (short-term and long-term)—Weekly goals, related to the topics discussed in class, kept simple and easily attainable.
- ▶ Providing guidance and feedback for students on how to vary their exercise routines to avoid boredom.
- ▶ Self-reinforcement and monitoring (and positive reinforcement from others).
- ▶ Overcoming barriers (identifying and finding alternatives)—discuss lack of time, inconvenience of facilities, bad weather, dislikes, and safety issues.
- ▶ Assist learners in recognizing the intrinsic rewards of an activity, such as focusing upon the relaxation response after a session of moderate cardiovascular exercise.

Increasing Social Support:

- ▶ Class partners, friends, and family members should be involved in discussing goals, reinforcing behavior, and checking accomplishments. Proposing simple goals that involve family members and friends has proven to be effective.
- ▶ Extrinsic rewards (praise and material rewards, such as giving prizes to those who meet *their* activity goals) should be given intermittently and as surprises (i.e., these rewards should not be expected). The greatest reward should be the satisfaction derived from the process itself (enjoyable physical activity).

Using Self-Assessment:

- ▶ Habitual physical activity, interests, and opportunities: class partners should list and discuss opportunities and facilities available—on campus and in their neighborhoods.
- ▶ Fitness testing and interpretation: learn to assess and evaluate fitness factors (and their importance for health and performance). Fitness scores should be considered personal information and should never be used for grading.

Table 3. Questions adapted from Kimiecik and Blissmer (1998) for assessing psychological constructs for the purpose of providing client exercise behavior consultations.

PSYCHOLOGICAL CONSTRUCT	QUESTION
Perceived Behavioral History	Can you tell me a little about your past exercise attempts?
Personal Goals	What do you want to do?
Personal Readiness	Are you ready to do it?
Perceived Benefits	What do you think will be the benefits of achieving your goal or exercising regularly?
Perceived Barriers	What might be the barriers preventing you from doing what you want to do?
Self-Efficacy	How confident are you that you can control or overcome each of these barriers to do what you want to do?
Social Support	Do you need the support of your family and friends to achieve your goal? If you do, will you obtain their support?
Enjoyment	What kinds of physical activity do you enjoy participating in the most? What is it specifically about these activities that you enjoy? How can you find ways to participate regularly in these activities?

Experiencing Positive, Fun Activities:

- ▶ The proposed activities (sports, aerobics, weight lifting, dance, hiking or biking, canoe trips, etc.) can be discussed with students so that they are presented with options that are varied and challenging, allow them to learn skills, and offer an opportunity for socialization (Figure 3).

Finally, concerning some further practical suggestions, physical educators should provide students with stimulating and relevant information relative to health and fitness. Furthermore, practitioners should assess the stages of change of their students and teach appropriate behavioral strategies for initiation and/or maintenance of physical activity. In addition, teachers should assist

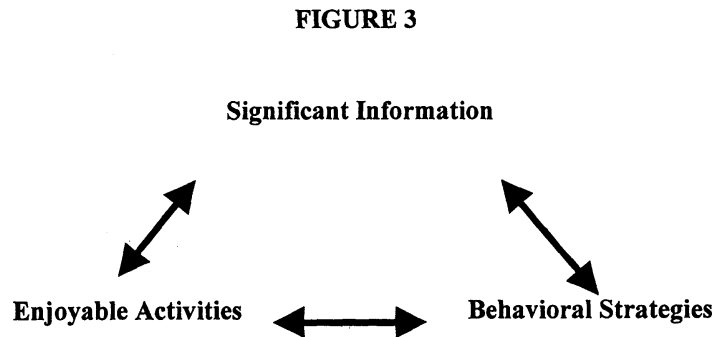


Figure 3. Key Factors for Successful Physical Activity Promotion in High School and College Physical Education.

students in identifying and overcoming barriers to physical activity, which includes providing students with multiple opportunities for a wide-variety of physical activity within and outside physical education classes.

REFERENCES

- Bandura, A. (1977). Self-efficacy: toward a unifying theory of behavioral change. *Psychological Review* 84:191-215.
- Bandura, A. (1986). *Social foundations of thought and actions: a social-cognitive theory*. Englewood Cliffs, NJ: Prentice Hall.
- Becker, M.H. & Maiman, L.A. (1975). Sociobehavioral determinants of compliance with healthcare and medical care recommendations. *Medical Care*, 13:10-24.
- Bouchard, C. & Shephard, R. (1994). Physical activity, fitness and health: the model and key concepts. In C. Bouchard, R.J. Shephard & T. Stephens (Eds.), *Physical activity, fitness and health*. Champaign, IL.: Human Kinetics.
- Brawley, L.R., Martin, K.A. & Gyurcsik, N.C. (1998). Problems in assessing perceived barriers to exercise: confusing obstacles with attributions and excuses. In J.L. Duda (Ed.), *Advances in sport and exercise psychology measurement*. Morgantown, WV: Fitness Information Technology, Inc.
- Brynteson, P. & Adams II, T.M. (1993). The effects of conceptually based physical education programs on attitudes and exercise habits of college alumni after 2 to 11 years of follow-up. *Research Quarterly for Exercise and Sports* 64:208-212.
- Calfas, K.J., Sallis, J.F., Lovato, C.Y., & Campbell, J. (1994). Physical activity and its determinants before and after college graduation. *Medicine, Exercise, Nutrition, and Health* 26:297-304.
- Cardinal, B.J. (1997). Construct validity of stages of change for exercise behavior. *American Journal of Health Promotion*, 12:68-74.
- Corbin, C.B. (1994). The fitness curriculum: Climbing the stairway to lifetime fitness. In R.R. Pate & R.C. Hohn (Eds.), *Health and fitness through physical education* (pp. 59-66). Champaign, IL: Human Kinetics.
- Dale, D., Corbin, C.B., & Cuddihy, T.F. (1998). Can conceptual physical education promote physically lifestyles? *Pediatric Exercise Science* 10:97-109.
- Dale, D. & Corbin, C.B. (2000). Physical activity participation of high school graduates following exposure to conceptual or traditional physical education. *Research Quarterly for Exercise and Sport*, 71:61-68.
- Dietz, W.H. & Gortmaker, S.L. (1985). Do we fatten our children at the television set?

- Obesity and television viewing in children and adolescents. *Pediatrics* 75:807-812.
- Dishman, R.K. (1993). Exercise adherence. In R.N. Singer, M. Murphey, & L.K. Tennant (Eds.), *Handbook of sports psychology*. New York: Macmillan.
- Dishman, R.K. (1994). Introduction: Consensus, problems, and prospects. In R.K. Dishman (Ed.), *Advances in exercise adherence* (pp. 1-27). Champaign, Illinois: Human Kinetics.
- Dishman, R. K. & Sallis, J.F. (1994). Determinants and interventions for physical activity and exercise. In C. Bouchard, J. Shephard & T. Stephens (Eds.), *Physical activity, fitness and health: International proceedings and consensus statement* (pp. 214-238). Champaign, Illinois: Human Kinetics.
- Edginton, C.R., Jordan, J.J., DeGraaf, D.G. & Edginton, S.R. (1995). *Leisure and life satisfaction: Foundational perspectives*. Dubuque, IA: Brown & Benchmark.
- Glanz, K. & Rimer, B.K. (1995). *Theory at a glance: a guide for health promotion practice*. US Department of Health and Human Services, 1995.
- Godin, G. (1994). Theories of reasoned action and planned behavior: usefulness for exercise promotion. *Medicine and Science in Sports and Exercise*. 26:1391-1394.
- Goldfine, B.D. & Nahas, M.V. (1993). Incorporating health-related fitness concepts in secondary school physical education curricula. *Journal of School Health* 63:142-146.
- Green, L.W. & Kreuter, M.W. (1991). *Health promotion planning: an educational and environmental approach*. Toronto: Mayfield Publishing.
- Kendzierski, D. & DeCarlo, K.J. (1991). Physical activity enjoyment scale: Two validation studies. *Journal of Sports and Exercise Psychology*. 13:50-64.
- Killen, J.D., Telch, M.J., Robinson, T.N., et al. (1988). Cardiovascular disease risk reduction for tenth graders: A multiple factor school based approach. *Journal of the American Medical Association* 260:1728-1733.
- Kimiecik, J.C. & Blissmer, B. (1998). Applied exercise psychology: Measurement issues. In J.L. Duda (Ed.), *Advances in sport and exercise psychology measurement*. Morgantown, WV: Fitness Information Technology, Inc.
- King, A.C., Bild, D., Dishman, R.K., Dubbert, P.M., Marcus, B.H., Oldridge, N.B., Paffenbarger, R.S., Powell, K.E., Yeaber, K., & Blair, S.N. (1992). Determinants of physical activity and interventions in adults. *Medicine and Science in Sports and Exercise*, 24:S221-S236.
- Marcus, B.H. (1995). Exercise behavior and strategies for intervention. *Research Quarterly for Exercise and Sports*, 66:319-323.
- Marcus, B.H., Rossi, I.S., Selby, V.C., Niaura, R.S. & Abrams, D.B. (1992). The stages and processes of exercise adoption and maintenance in a worksite sample. *Health Psychology* 11:386-395.
- Marcus, B.H., Selby, V.C., Niaura, R.S. & Rossi, J.S. (1992). Self-Efficacy and the Stages of Exercise Behavior Change. *Research Quarterly for Exercise and Sports* 63:60-66.
- McAuley, E. (1994). Physical activity and psychosocial outcomes. In C. Bouchard, R.J. Shephard & T. Stephens (Eds.), *Physical activity, fitness and health*. Champaign, Il.: Human Kinetics.
- Nigg, R. & Courneya, K.S. Transtheoretical model: examining adolescent exercise behavior. *Journal of Adolescent Exercise Behavior*. 22:214-224.
- Pate, R.R. & Hohn, R.C. (1994). A contemporary mission for physical education. In R.R. Pate & R.C. Hohn (Eds.), *Health and Fitness through Physical Education* (pp. 1-8). Champaign, IL: Human Kinetics Publishers.
- Pate, R.R., Pratt, M., Blair, S.N. et al. (1995). Physical activity and public health: A recommendation from the Centers for Disease Control and Prevention and the American

- College of Sports Medicine. *Journal of the American Medical Association*. 273:402-407.
- Pender, N.J. (1987). *Health promotion in nursing practice*. Norwalk, CT: Appleton-Century-Crofts.
- Prochaska, J.O. & DiClemente, C.C. (1982). Transtheoretical therapy: toward a more integrative model of change. *Psychotherapy Theor. Research and Practice*. 19:276-288.
- Prochaska, J.O. & Marcus, B.M. (1994). The transtheoretical model: applications to exercise. In R.K. Dishman (Ed.), *Advances in exercise adherence*. Champaign, Illinois: Human Kinetics.
- Reynolds, K.D., Killen, J.D., Bryson, S.W., Maron, D.J., Taylor, C.B., Maccoby, N., Farquhar, J.W. (1990). Psychosocial predictors of physical activity in adolescents. *Preventive Medicine* 19:541-551.
- Sallis, J.F. (Ed.) (1994). Physical activity guidelines for adolescents [Special Issue]. *Pediatric Exercise Science* 6:299-463.
- Sallis, J.F., Grossman, R.M., Pinski, R.B., Paterson, T.L. & Nader, P.R. (1987). The development of scales to measure social support for diet and exercise behaviors. *Preventive Medicine* 16:825-836.
- Sallis, J.F., Hovell, M.F. & Hofstetter, C.R. (1992). Predictors of adoption and maintenance of vigorous physical activity in men and women. *Preventive Medicine* 21:237-251.
- Sallis, J.F. & Owen, N. (1999). *Physical activity and behavioral medicine*. Thousand Oaks, CA: SAGE Publications.
- Sallis, J.F., Pinski, R.B., Grossman, R.M., Patterson, T.L., Nader, P.R. (1988). The development of self-efficacy scales for health-related diet and exercise behaviors. *Health Education Research* 3:283-292.
- Sallis, J.F., Simons-Morton, B.G., Stone, E.J. et al. (1992). Determinants of physical activity and interventions in youth. *Medicine and science in sports and exercise* 24:s248-s257.
- Sechrist, K.R., Walker, S.N. & Pender, N.J. (1987). Development and psychometric evaluation of the exercise benefits/barriers scale. *Research in Nursing & Health*, 10:357-365.
- Simmons-Morton, B.G., Parcel G.S., Ohara, N.M. (1988). Implementing organizational changes to promote healthful diet and physical activity at school. *Health Education Quarterly* 15:403-425.
- Sparling, P.B., Owen, N., Lambert, E.V., & Haskell, W. (2000). Promoting physical activity: the new imperative for public health. *Health Education Research*. 15:367-376.
- Stokols, D. (1992). Establishing and maintaining healthy environments: Toward a social ecology of health promotion. *American Psychologist*, 47:6-22.
- US Department of Health and Human Services. (1996). Physical activity and health: A report of the Surgeon General. Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion.
- US Department of Health and Human Services. (1999). Promoting physical activity: a guide for community action. Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion.
- Welk, G.J. (1999). The youth physical activity promotion model: a conceptual bridge between theory and practice. *Quest*, 51:5-23.

Markus V. Nahas is a faculty member in the Physical Education department at the Universidade Federal de Santa Catarina in Brazil while Bernie Goldfine and Mitchell A. Collins teach within the department of Health, Physical Education and Sport Science at Kinnesaw State University, Georgia.