Healthy Youth Places promoting nutrition and physical activity

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Abstract

To reduce the risk for chronic disease, adolescents should eat at least five servings of fruit and vegetables and be physically active daily. The Healthy Youth Places Project will test if an intervention strategy that implements school environmental change—with adult leader and youth participation—will influence and maintain adolescent fruit and vegetable consumption and physical activity. Using an experimental design, middle schools will be randomized (eight intervention and eight control schools), and the health behavior of a cohort of adolescents will be assessed during Grades 6 (baseline), 7 and 8 (intervention), and 9 (follow-up). The project uses an ecologically informed social cognitive model to inform a place-based intervention that encourages participation in the process of planning and implemented environmental change in targeted adolescent physical and social environments (school lunch place and after school program place). Environmental change is defined as implemented practices, programs and policies that promote critical elements (connection, autonomy, skill-building and healthy norms) in places. These critical elements are hypothesized environmental antecedents of social cognitive mediators of behavior change. The Project develops a place-based dissemination model of multiple levels (project, school and place) that are hypothesized to build the skills and efficacy of leaders (school staff and youth) that implement environmental changes.

Introduction

Proper nutrition and a physically active lifestyle are two important preventive health behaviors for children and adolescents. Indeed, scientific consensus panel reports have consistently recommended that children and adolescents eat at least five servings of fruit and vegetables and participate in daily physical activity to reduce the risk of chronic disease and premature death. Currently, however, youth are not meeting policy standards for these two health behaviors (US Department of Health and Human Services, 2000).

It appears that the middle school years may be a critical developmental period to deliver intervention strategies because children are at great risk for difficulty (Eccles et al., 1993, 1996; Eccles, 1994; Baranowski et al., 2000b). There is considerable evidence for motivational declines across a wide range of behaviors during this period (Eccles et al., 1996). For example, Lytle et al. reported that fruit consumption decreased by 41% between Grades 3 and 8 (Lytle et al., 2000). Sallis has estimated that physical activity declines over the school age years at about 2.7% yearly for males and 7.4% per year for females (Sallis, 1993). To compound this problem there is some evidence that adolescents’ behavioral decisions will impact behaviors and health throughout their life (Telama et al., 1997).

Therefore, the challenge is to develop an

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effective behavior change intervention that influences fruit and vegetable consumption and physical activity in middle school children. Results from fruit and vegetable and physical activity intervention studies and more comprehensive cardiovascular disease prevention studies suggest that schools are a promising avenue to promote health behavior change. However, qualitative and meta-analytic reviews of the literature suggest that atheoretical interventions have contributed to the weak efficacy of school-based interventions (Resnicow and Robinson, 1997; Stone et al., 1998). The use of interventions based on theoretical frameworks provides an opportunity to develop effective strategies to change these two health behaviors. Small changes in fruit and vegetable consumption resulting from theory-based middle school-based interventions have been found (Baranowski et al., 2000a; Gortmaker et al., 1999). In addition to the theoretical problems above, past school-based interventions may have had insufficient intervention implementation (Baranowski and Stables, 2000b). Improving the quantity and quality of the delivery of interventions has been advocated to be an important means for enhancing strategy effects (Resnicow and Robinson, 1997). The use of theoretical frameworks also provides an opportunity to develop effective strategies to improve the process of program implementation. In sum, although research findings encourage continued school-based research, small effects demonstrate a need to develop theory-based interventions delivered with a broader and more enduring influence.

This paper will describe the Healthy Youth Places Project and the process by which theory informed the development of the intervention. The intervention was designed to fill three gaps in the literature. There is a need for an intervention that: targets both diet and physical activity change in middle school students, draws on theory to develop a strategy to achieve health behavior change in students, and draws on theory to develop a strategy to improve the process of intervention implementation in school settings.

Theoretical approach

The focus of this section is to describe the issues underlying our choice of theories for use in developing the intervention for the present project. A primary issue that directed our theoretical choice is that the Healthy Youth Places Project is an effectiveness trial. Effectiveness trials test whether an intervention does more good than harm when delivered under real-world conditions (Flay, 1986). In contrast, efficacy trials provide tests of whether an intervention does more good than harm when delivered under optimum conditions (Flay, 1986).

Although, efficacy is a necessary component, it alone is not sufficient to ensure intervention effectiveness. In effectiveness trials, the impact of the intervention is due to: (1) its level of efficacy, (2) the availability of the intervention to the target audience and (3) the level of acceptance of the intervention by the target audience (Flay, 1986). The availability of the intervention in the Healthy Youth Places Project is determined by the extent to which leaders implement the intervention so that youth have the opportunity to participate. The level of acceptance of the intervention directly relates to youth’s decision to participate in intervention activities. For example, acceptance relates to whether students attend an after school program where the intervention is delivered.

Our choice of theories directly resulted from our interest in demonstrating the effectiveness (efficacy, availability and acceptance) of our intervention. These three issues led to the need to utilize an theoretical approach that addresses both potential systematic, institutional or environmental variables that exist in real-world contexts and individual level variables associated with behavior change. What follows is a description of the research and theory that led to the use of ecological models (Barker, 1968; McLeroy et al., 1988; Brofenbrenner, 1999) combined with Social Cognitive Theory (SCT) (Bandura, 1986) to develop a strategy for health behavior change.

Efficacy of intervention

Our goal was to draw on theory that identifies the mechanisms between specific implemented
components of the intervention strategy (environmental changes), adolescent psychosocial processes and health behavior outcomes. The identification of these psychosocial processes was facilitated by Bandura’s SCT (1977, 1986, 1997). The theory includes a global hypothesis of triadic reciprocation between an individual, his/her environment and behavior, and provides a framework for intervention development that targets both individual level cognitions (i.e., self-efficacy and outcome expectations) and environmental variables as potential mediators of health behavior change. SCT has been supported in basic research (Bandura, 1996). However, the importance of the hypothesized social cognitive-driven processes on health behavior change in school settings with youth remains to be established (Baranowski et al., 1998, 1999; Sallis et al., 2000).

Although basic research has shown that environmental variables can influence individual psychosocial processes and subsequent behaviors, these environmental variables are not clearly organized in Bandura’s theory (Bandura, 1986). One line of research has suggested that important environmental variables can be described as implemented practices, programs and policies (Richter et al., 2000). Project CATCH, for example, increased student physical activity though implementing changes in teacher practices and physical education programs (McKenzie et al., 1996). An additional way to characterized environmental variables is to focus on characteristics of the social environment, which has been labeled under such headings as ‘school climate’, ‘school culture’, ‘affordances’ and ‘person–environment fit’ (Eccles et al., 1993; Eccles et al., 1996; Maehr and Midgley, 1996; Dzewaltowski, 1997). If the environments in the middle school do not include certain critical elements that meet the psychological needs of children and adolescents, then SCT predicts a decline in motivation, interest, performance and behavior.

The basic social cognitive literature suggests that environments should have at least four critical elements: connection, autonomy, skill-building and healthy norms (CASH) (Dzewaltowski et al., 2002). People need a place where they feel connected and have a sense of belonging. People who feel detached and isolated will neither enter nor return to participate (Catalano and Hawkins, 1996). People also need a place where they have control over their actions or autonomy (Deci and Ryan, 1985; Bandura and Wood, 1989; Bandura, 1997). Social and physical environments encourage people to make choices, and learn from their successes and failures. People need a place where they can master skills develop efficacy and demonstrate those skills (Dweck, 1986; Wood and Bandura, 1989). Skills matter to long-term success, and success is about becoming competent at something that is positive and healthy. Finally, people need a place where the group norm is healthy behavior (Forsyth, 2000). All too often, people do not have the opportunity to be healthy and places may not offer healthy examples or intentionally encourage healthy choices. Although the Healthy Place Project organizes these conceptual hypotheses in a novel manner, there is considerable research to support the influence of well-structured physical and social environments on individual capacity and healthy behavior [e.g. (Barker, 1968; Bandura, 1996; Eccles et al., 1996; Forsyth, 2000)].

This project chose behavior-setting theory (Barker, 1968) to help define the environments that middle school students encounter and how these environments are developed. Barker proposed that behavior occurred in physical and social environments labeled as behavior settings (Barker, 1968). For example, adolescent behavior settings in schools include the classroom, the lunchroom and the after school program. Behavior settings are developed by individuals with a high degree of responsibility and involvement in developing the social and physical environment. As a result these individuals are key behavior setting leaders who represent a targeted population for the implementation of the Healthy Youth Places Project. The use of these leaders as agents of change is what Barker defined as centrality of penetration (Barker, 1968). According to Barker, the critical elements of behavior settings may directly influence student
health behavior. The combination of the basic social cognitive literature and Barker’s behavior setting theory led to the central efficacy hypothesis of the Healthy Youth Places Project—leader behavior creates environments that provide connection, autonomy, skill-building and healthy norms, which will influence individual psychosocial processes and will promote the targeted healthy behavior.

**Availability and acceptance of intervention**

Availability and acceptance of the Healthy Youth Places intervention is dependent on the level to which the strategy is delivered across schools, how adult personnel and students implement the strategy within each school, and whether the target audience can participate and gain access to the implemented intervention. To guide the development of a strategy to improve the availability and acceptance of our intervention we drew on SCT (Bandura, 1986), ecological models (Barker, 1968; McLeroy et al., 1988; Brofenbrenner, 1999) and the dissemination literature (Rogers, 1995).

If the critical environmental elements described above are necessary in behavior settings to promote health behavior change, then these elements are likely to also be important to promote the implementation and acceptance of environmental changes as well. Therefore, the central availability and acceptance hypothesis was that leader behavior creates implementation environments that provide connection, autonomy, skill-building and healthy norms, which will influence leader psychosocial processes and will promote the targeted environmental change behavior.

McElroy and colleagues variation of Brofenbrenner’s ecological model proposed that the social and physical environment (behavior settings) where implementation and acceptance occur is the result of nested systems (McLeroy et al., 1988; Brofenbrenner, 1999). Specifically, interpersonal processes of a behavior setting (school lunch and after school programs) are nested within institutions (schools), which are nested within community factors and more global local, state and national laws and policies. Therefore, ecological models provided a means to define the multiple levels of behavior settings that an intervention strategy can and most likely must be implemented to achieve environmental change in the behavior settings that reach adolescents.

Traditionally, behavioral intervention programs have attempted to deliver innovative theory-based strategies through a centralized strategy diffusion model, where control for the content of the strategy flows in a top down fashion. The governing organization defines the protocol of the intervention and the local leader is held accountable for delivering the intervention strategies according to that protocol. An alternative to the top-down centralized strategy is a decentralized diffusion system (Rogers, 1995) that provides control, autonomy, skill-building and healthy norms to the leaders of intervention delivery. An example of a decentralized diffusion system that provides the critical elements described above is a community building participation approach that provides control to local decision makers [e.g. (Green et al., 1999)]. Participatory community-building approaches have been effective in implementing environmental change to promote healthy eating and activity in an elementary school demonstration project (Harris et al., 1997a,b; Richter et al., 2000).

In summary, this research project draws on an ecological model combined with social cognitive theory to develop a strategy for health behavior change. The ecologically informed social cognitive model was chosen for the following reasons: (1) the model specifies the specific critical environmental elements and psychosocial processes mediating the efficacy of environmental change interventions on adolescent health behavior change; (2) the model defines how those critical environmental elements may be influenced; and (3) the model also defines additional levels of intervention necessary to implement environmental change and to study the mechanisms underlying success of implementation.

**Study methods**

The Healthy Youth Places Project is a group-randomized trial where eight middle schools are...
randomly assigned to intervention and eight to control conditions. The middle schools recruited for participation house Grades 6–8 and agreed to participate prior to randomization. The behavior and potential determinants of physical activity and diet of a cohort of adolescents are assessed each spring (Grade 6, baseline; Grade 7, intervention; Grade 8, intervention) to minimize the effect of seasonality. We will also collect follow-up data to determine if the adolescents generalize their new skills, efficacy and behavior to their high school environments. This generalization data will be collected during spring of the cohort’s Grade 9.

Measures

Fruit and vegetable consumption will be measured by a validated youth/adolescent food frequency questionnaire (Rockett et al., 1997). To verify dietary change all schools will be equipped with a computerized system to track the student food purchases in the school. The Previous Day Physical Activity Recall (PDPAR) provides a valid and reliable estimate of bouts of moderate to vigorous activity (Weston et al., 1997). To verify physical activity change, objective activity monitoring using an accelerometer will be completed on a subsample of the participants in the study.

Several psychosocial determinants will be measured by a questionnaire that assesses youth perceptions of self and school environments. For example, self-efficacy for physical activity and fruit and vegetable consumption and outcome expectations at school lunch (social, and fruit and vegetable consumption) and after school program (social, fruit and vegetable consumption, and physical activity) will be measured. In addition, perceptions of the school lunch and after school environment will also be obtained (connection, autonomy, skill-building and healthy norms).

Implemented social and physical environmental changes in the school environment will be measured by an established logging system that quantifies environmental change as implemented practices, programs and policies (Fawcett et al., 1995). In addition, these logged environmental changes will be categorized according to their quality of providing connection, autonomy, skill-building and healthy norms within targeted behavior settings. The determinants of implemented school environmental changes will be assessed by a questionnaire delivered to school adult and student leaders participating in a school change team described below. For example, the team will be assessed on their collective efficacy to lead environmental change in the school.

Intervention: the Healthy Places Framework

The Healthy Places Framework was developed to provide the ecologically informed social cognitive model an operating system for the implementation of effective public health interventions (Dzewaltowski et al., 2002). The Framework includes the following: place-based diffusion system model, place-based planning and implementation model, and performance community resources and healthy place change team resources.

Place-based diffusion system

The Healthy Places Framework diffusion system depicted in Figure 1 allows for the delivery of intervention strategies to the behavior settings, or places, where adolescents spend a large proportion of their time. To reach targeted adolescent places, the Healthy Places intervention forms a project level behavior setting, labeled the performance community, that includes behavior and environmental change experts and part-time paid school site coordinators. School site coordinators are members of school staff with an interest in health promotion. The school site coordinators then form a school level behavior setting called the healthy places change team. To ensure centrality of penetration (Barker, 1968), the healthy places change team is made up of place leaders (youth and adults) at their school and key stakeholders. Place leaders are individuals with a high degree of responsibility and involvement in the places where adolescents spend the majority of their school time (e.g. the classroom, lunch room and after school program). For example, the director of school food service
is a place leader of the school lunch behavior setting. Recreation staff are place leaders of the after school program behavior setting.

**Place-based planning and implementation model**

The primary application of the place-based planning model is to allow the leaders of behavior settings to participate in making the day-to-day decisions that in aggregate influence the development of the adolescent physical and social environments through group goal-setting and planning, group monitoring, and group feedback. This model was developed to illicit greater intervention availability and acceptance. The place-based planning steps are as follows:

**Step 1:** Target a place.
**Step 2:** State and document an objective that answers one of the following two questions; (a) How will we develop a healthy place? (b) How will we contact and attract the participants to a place?

**Step 3:** Attempt to develop an objective that increases the total time in contact with the targeted population.

**Step 4:** Identify and describe the targeted critical environmental processes of the planned objective (i.e. connection, autonomy, skill-building and healthy norms).

**Step 5:** Describe how the objective affects task and social appeal of the place for the students.

Because the resources and needs of each school vary widely, the activities in the targeted places at each school also vary widely. The ecologically informed social cognitive model proposed that, regardless of the objectives, places that provide critical environmental elements that influence

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**Fig. 1.** Place-based diffusion system.
social cognitive mediators would promote targeted healthy behavior. Within the place-based planning model, there are a number of strategic objectives targeted. The ecologically informed social cognitive model defined that skills and self and collective efficacy for environmental change are developed through social persuasion, vicarious modeling experiences and mastery experiences (Bandura, 1996, 1997). To facilitate capacity building for environmental change, the dissemination system facilitates Healthy Place Change Teams to develop and locate resources that provide each of these sources of information for use by leaders in local communities as part of the planning and implementation process. A central assumption in the development of these resources is the ability for leaders to use the information without continued dependence on experts.

**Performance community resources**

*Social persuasion*

To provide social persuasion to motivate the group toward task goals, the performance community attends four time yearly face-to-face meetings. Central to the intervention is the combination of face-to-face meetings with ongoing technical support and training to leaders, i.e. theory-based principles are discussed and applied to potential in-school objectives. These meetings also provide an opportunity for cross-site collaboration on objectives, and allows for place leaders to interact and connect with one another. In addition to quarterly meetings, monthly conference calls supplement the face-to-face technical assistance, training and group interaction. After the establishment of a face-to-face across site performance team, Healthy Place Performance Community provides a leader-to-leader website. This website allows leaders to connect with other leaders through a message board and other tools, and organize their efforts around the Healthy Youth Places intervention.

*Vicarious modeling experiences*

One challenge to the development of the capacity of efficacious site coordinators and Healthy Place Change Teams is the lack of past successful environmental change experiences. A central aspect of developing self-efficacy in the site coordinators is the use of strategies that will provide vicarious experiences. Hence, the intervention also includes a series of video model documentaries that provide stories of successful group-based environmental change experiences. These stories are delivered in the quarterly meetings and then provided to the site leaders for use with local change teams. The stories are hypothesized to raise self-efficacy and collective efficacy for environmental change.

*Mastery experiences*

Site leaders are trained on the place-based planning model described above and provided with feedback documenting progress as environmental changes are implemented. The Healthy Youth Place Evaluation (HYPE) is a goal-setting and monitoring tool designed to provide groups with information to make choices about where to invest their efforts. The tool provides mastery information to help groups understand how they are progressing in implementing their place-based environmental changes.

**Healthy place change team resources**

*Social persuasion*

In general, all activity that occurs in the performance community is a resource for site leaders to use in their facilitation of their healthy place change teams. Each site leader has a goal to create a local change team and have face-to-face meetings where strategies are defined and logged using the HYPE system described above.

*Vicarious modeling experiences*

In addition to the documentary videos modeling successful environmental change efforts, each healthy place change team was equipped and trained to produce local documentary-style public service announcements and environmental change model videos. The goal for each student and adult team (one per school) is to create a video and other media that (1) identify school fruit and vegetable and physical activity goals and options,
Fig. 2. Multilevel mediation research model.

(2) identify barriers to these behaviors, and (3) suggest ways to build new attractive, accessible fruit and vegetable and physical activity options. Recent technological developments in digital video cameras and digital video editing software have made video production an inexpensive information-sharing strategy.

Mastery experiences
As described above, the healthy place change teams are encouraged to focus their efforts on targeting the development of two places: school lunch and after school programs. Their successes are documented through feedback by the site coordinators using the HYPE system. To link students to the healthy place change team, in the classroom students are taught healthy place development skills through a series of active learning lessons. In each intervention year, teachers will be given a goal to implement lessons that teach the importance of fruit and vegetable consumption and physical activity, build environmental change skills, and provide suggested environmental changes for school lunch and out-of-school programs. In concert with the healthy place change team, the student outcomes from curricular activities will inform school objectives to change school lunch and after school programs. This component of the intervention will provide personal mastery experiences to build individual and group capacity and skills and provide mastery experiences to raise self-efficacy.

Intervention effect
Figure 2 illustrates a multilevel mediation research model designed to test the hypothesized mechanisms underlying the intervention effect. At the adolescent level, the perceived environment (critical environmental elements) and perceived self (self-efficacy and outcome expectations) are hypothesized to mediate the influence of the intervention on fruit and vegetable consumption and physical activity. At the school level, the intervention effect on health behavior is hypothesized to
be mediated by collective perceptions and by implemented environmental changes within schools.

Across the multilevel model, the design allows for testing if implemented environmental changes are mediated by the hypothesized individual level variables (Path A), which is consistent with social cognitive theory. Alternatively, environmental changes may have a direct effect on behavior on health behavior (Path B). To test across levels, multilevel modeling using PROC MIXED will be applied to test mediation and moderation effects (Littell et al., 1996).

**Contribution**

Several results from the Healthy Youth Places Project, regardless of the effectiveness of the intervention, may have an impact on the health behavior field. The data generated from this project will contribute to understanding the health behavior of middle school students in three ways. First, social psychological mediators will be assessed throughout the project. Basic psychosocial theory specifies the processes (mediators) through which interventions affect the development and maintenance of the desirable or undesirable behaviors. There is a gap in the literature such that additional theory-based research is needed to identify the mechanisms underlying health behavior change, and to develop interventions to influence these mediating mechanisms and subsequent behavior (Baranowski et al., 1998).

Second, by targeting places in middle schools, the role that critical environmental elements may have in influencing psychosocial processes and subsequent health behaviors will be examined. Physical and social environments can provide or limit opportunities for healthy behavior, social development and capacity building (Wechsler et al., 2000). Furthermore, through the experimental design, this project will provide information regarding physical and social environmental disparities between schools and the subsequent impact of those disparities. It will also examine a framework whereby disparities can be reduced.

Third, the project is multilevel, focusing on individual and group environments, thereby providing information regarding the mechanisms that determine behavior change at each level. This multilevel focus should broaden the theory-based understanding of the mechanisms underlying the quantity and quality of program implementation.

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