

## ***Participatory Prevention Research Model Promotes Environmental Change for Healthier Schools***

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*Barriers exist to healthy eating and physical activity for children in the school environment. Modifiable school environmental factors have led to the development of the Nutrition Friendly Schools and Communities (NFSC) model to prevent the development of overweight in school children and adolescents. The design of the NFSC environmental intervention is to actively engage the school community to prevent overweight in school-aged children. This article presents data measuring the environmental changes achieved by the Los Angeles Unified School District (LAUSD) elementary schools participating in a 3-year participatory research pilot study funded by the Centers for Disease Control and Prevention (CDC). An objective of the pilot study is to determine whether any or all of the 15 steps developed for the NFSC model could be implemented. Further, researchers want to know if any of the study schools could implement the NFSC model as a whole during the allotted time of the pilot study.*

**Keywords:** *childhood obesity; participatory prevention research; school-based health promotion; environmental change*

**M**any barriers stand in the way of healthy eating and physical activity for children and adolescents, including factors in the school environment. The possibility of addressing modifiable school environmental factors led to the development of the

Nutrition Friendly Schools and Communities (NFSC) model in preventing the development of overweight in children and adolescents. The purpose of the NFSC environmental intervention is to actively engage the school community to prevent overweight in school-aged children. This goal is to be reached through a multilevel participative process that facilitates coordinated changes in the school environment in areas based on the Coordinated School Health Model (Allensworth & Kolbe, 1987): nutrition education, physical education, health services, food services, school policy, staff wellness, psychosocial services, and family/community involvement.

### **► BACKGROUND**

Rates of overweight, defined in this study as body mass index (BMI) greater than 95% for age and sex, in children and adolescents are reaching epidemic proportions, nearly tripling over the past 30 years (United States Department of Health and Human Services, 2001). Research and public policy call for schools to play an active role in establishing an environment that promotes healthy nutrition and physical activity. In the *Surgeon General's Call to Action to Prevent and Decrease Overweight and Obesity*, actions to guide school personnel, families, and community groups in reducing childhood weight gain and obesity are presented. Among the recommendations is the adoption of policies ensuring that all foods and beverages available on school campuses and at school events contribute toward eating patterns that are consistent with the dietary guidelines for Americans (United States Department of Health and Human Services, 2001). This position is consistent with that of the American Dietetic Association (ADA), which recommends a nutrition integrity policy as a framework for an integrated,

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comprehensive, and environmental approach to establishing school nutrition programs, including nutrition education and food service (American Dietetic Association, 2006b). In addition, the ADA holds in its most recent position paper that intervening in childhood overweight requires a combination of family and school-based programs that are multidimensional, including promotion of physical activity, parent training or modeling, behavioral counseling, and nutrition education (American Dietetic Association, 2006a). Although the ability of schools to support healthful eating may be compromised because of inconsistent nutrition messages, policies, and practices (Gross & Cinelli, 2004), Sallis et al. (2003) have found that environmental and policy interventions could be effective in school health promotion, including nutrition and physical activity in some children.

The Centers for Disease Control and Prevention's (CDC) School Health Index (SHI) forms the basis for several studies on changing school environments to promote healthier nutrition and physical activity (Centers for Disease Control and Prevention, 2002). Researchers have tested various strategies, including facilitation, to implement components of the SHI in Arizona (Staten et al., 2005), New England, and the Midwest (Austin, Fung,

Cohen-Bearak, Wardle, & Cheung, 2006). Using a national sample, Brener et al. (2006) examined the implementation of the SHI model as a whole. Our work tests both strategies in a new model.

The concept for the NFSC model came about as part of an ongoing collaboration between the Los Angeles Unified School District (LAUSD) Nutrition Network, a group providing grants to low-income schools for programs in nutrition education and physical activity, and the University of California Los Angeles (UCLA). In 2002, an innovative asset-based strategy for engaging school-community stakeholders to become actively involved in changing the nutrition and physical activity environment of their schools was developed. The model combines the eight environmental components of the Coordinated School Health Model (CSHM; Allensworth & Kolbe, 1987) with the accreditation approach of the Baby Friendly Hospital Initiative (BFHI; Philipp et al., 2001) to provide school-community stakeholders the overarching planning and evaluation structure needed to improve nutrition and physical activity at their schools. Following completion, institutionalization of these efforts would be achieved through an external evaluation and certification of the school. A full description of the development of the 15-step NFSC model has been published elsewhere (Vecchiarelli, Prelip, Slusser, Weightman, & Neumann, 2005).

This article presents the environmental changes achieved by LAUSD elementary schools participating in a 3-year pilot study. One objective of the pilot study was to determine whether any or all of the 15 steps (Table 1) developed for the model could be implemented in the field. Further, we wanted to know if any of the study schools would be able to implement the model as a whole during the 3-year pilot study period. The pilot project was funded by a Community-Based Participatory Prevention Research grant from the Centers for Disease Control and Prevention. Institutional Review Boards at UCLA and LAUSD's Program Evaluation and Research Branch approved the study.

### **METHOD**

**Research design.** This study used a longitudinal design to collect data at the school level to test the model conceptually and in application. Study schools were tracked over time as data were collected at four 6-month intervals, from baseline to the end of the study, to capture model coherence and model feasibility in the field.

**Study sample.** Starting in spring 2002, elementary schools were recruited from the LAUSD in Los Angeles,

**TABLE 1**  
**Nutrition Friendly Schools and Communities 15-Step Criteria**

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Step 1. The school has a written nutrition and physical activity policy that is routinely communicated to all school staff and volunteers.

Step 2. The school administration supports efforts to promote healthy eating and physical activity among all school community stakeholders, including staff, students, and families.

Step 3. There is a collaboration throughout the school community (including parents, teachers, school food service, school health services, students, administrators, and school psychosocial services) regarding nutrition and physical education.

Step 4. The school has a standardized nutrition education curriculum that is integrated into other school subjects, including language arts, math, science, and social studies.

Step 5. School food service provides healthy foods that adhere to the USDA recommendations, specifically for fat, saturated fat, sodium, and cholesterol for breakfast, lunch, and snack.

Step 6. The school staff and students have input into school meal planning.

Step 7. The school has a physical education curriculum/program that is adhered to by a minimum of 80% of eligible staff.

Step 8. A minimum of 85% of classrooms participate in a minimum of 20 min of moderate to vigorous daily physical activity.

Step 9. The school has 1 nurse for every 750 students.

Step 10. School health services identifies and refers students with nutrition and physical activity issues within 5 days of initial contact.

Step 11. The school has a staff wellness program that is offered to all staff and that promotes healthy eating and physical activity.

Step 12. The school staff is committed to serve as role models for healthy behavior.

Step 13. The school includes family and community members (such as business, religious, and nongovernmental organization leaders) in nutrition education and physical education.

Step 14. Family and community members actively promote healthy eating and physical activity.

Step 15. School psychosocial services support healthy eating and physical activity.

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NOTE: USDA = United States Department of Agriculture.

California. Schools were selected for recruitment if at least half of the enrolled students were eligible for free or reduced school meals. A convenience sample of eight intervention schools (Table 2) was selected based on their capacity to implement the intervention and willingness to become part of the study. The schools clustered geographically in Los Angeles County, four in West Los Angeles/West Hollywood and four in East/South Los Angeles, making it possible for each cluster to share community resources and one of two external school liaisons. Schools received US\$11,500 in unrestricted funding for participating over the 3-year study period.

*Self-assessment tool.* The formulation of the self-assessment tool was based on experience provided by school-community stakeholders, including teachers, school administrators, cafeteria managers, nurses, parent center coordinators, and after-school coordinators who participated in developing the 15 steps for the model.

Feedback from these stakeholders and from the LAUSD nutrition network suggested that a user-friendly tool developed with user input on its development was needed. The self-assessment tool drew from the CDC's SHI (Centers for Disease Control and Prevention, 2002) and the United States Department of Agriculture's (USDA) school improvement checklist (United States Department of Agriculture, 2000). With fewer criteria and the inclusion of additional components from the school environment, including health services, physical activity, and psychosocial services, the self-assessment tool is specific to the NFSC model.

*Implementation plan.* To implement the model, each school was asked to assemble a committee consisting of parents, teachers, administrators, staff, and students to work on the project. All schools either established new committees or utilized already established health-related committees to work on the project. The designated committee conducted a sequence of four self-assessments

**TABLE 2**  
**Demographics of Participating Schools**

<i>School</i>	<i>Calendar</i>	<i># Students</i>	<i>Student Race/Ethnicity</i>	<i>% Free/Reduced</i>
School 1	Traditional	581	8.9% Asian, 2.4% Filipino, 13.4% African American, 45.6 Hispanic, 29.3% White	60.2
School 2	Traditional	582	1.0% Asian, 3.8% African American, 92.8% Hispanic, 1.0% White	91.8
School 3	Traditional (K-9)	360	35.8% African American, 61.2% Hispanic, 1.1% American Indian/Alaskan Native, 1.1% White	100
School 4	Traditional	284	9.4% Asian, 5.5% Filipino, 3.9% African American, 76.1% Hispanic, 5.1% White	96.1
School 5	Traditional	1,465	99.6% Hispanic	82.7
School 6	Traditional (language/social justice magnet)	415	2.8% Asian, 64.5% African American, 30.8% Hispanic, 1.9% White	84.8
School 7	Year round (science magnet), 3 Track	926	99.9% Hispanic	88.9
School 8	Year round (4 Track)	1,344	99.6% Hispanic	94.7

over the course of the study. The initial self-assessment, based on existing assets, determined which of the 15 steps each school met, all or in part. The committee then drew up an action plan for addressing the steps that had not been met or partially met and continued to conduct self-assessments every 6 months for 2 years revising the action plan as needed until the end of the study. Schools used their unrestricted funding for nutrition education books and materials, physical activity equipment, healthy snacks, salary for a physical education coach, and extended school nurse hours to implement the model (Vecchiarelli, Lange, LaVaccare, & Cerda, 2006).

Each action plan was unique and school specific because, as part of the participatory process, the criteria required to meet each step were not operationalized a priori—That was left for the schools to determine. Because the 15 steps were not ordered, schools were free to address the 15 steps in any sequence they chose. However, under the environmental formulation of the model, all schools were required to assess each step and develop an action plan to meet each step over the study period. Each school worked independently from the other schools in the study except for sharing community resources, such as local farmers markets, non-profit organizations, and retail establishments.

*School liaisons.* Two individuals were hired by the research team to serve as school liaisons for the project,

one liaison for each four school cluster. Each of the school liaisons lived in the community where the assigned four schools were located, with one school liaison bilingual in Spanish. The research team felt this was imperative because the liaisons would be familiar with the resources available in their respective communities, had established community connections that could be valuable to the project, and their local residency added to their credibility within the school community. The school liaisons provided technical assistance to schools in forming committees, completing the self-evaluation, developing and implementing an action plan, identifying community resources, and locating additional funding sources. The distribution of the liaisons' time and effort was intended to be equal among all schools.

*Data analysis.* Data for this article consist of the self-assessments completed by the school committees at four points during the study: at baseline in fall 2003, spring 2004, fall 2004, and spring 2005. Schools rated themselves as having met, partially met, or not met each of the 15-step criteria. For analysis purposes, we dichotomized these responses to yes or no and included partially met with no. Because of small cell sizes, Fisher's Exact Test was used to estimate statistically significant change in the number of steps each school met between baseline and study's end as well as the change over time in how many steps were completed overall.

**TABLE 3**  
**Achievement in Meeting 15 Steps by Eight Pilot Study Elementary Schools at Baseline and Completion of Study**

	<i>Fall 2003</i>	<i>Spring 2005</i>	<i>Significance Level</i>
	<i>Requirement Met</i>	<i>Requirement Met</i>	
	<i>n (%)</i>	<i>n (%)</i>	
Step 1. Written nutrition/PA policy	0 (0.0)	5 (62.5)	<i>p</i> = .0256
Step 2. Administrative support	3 (37.5)	7 (87.5)	n.s.
Step 3. School community collaboration	0 (0.0)	5 (62.5)	<i>p</i> = .0256
Step 4. Standardized nutrition curriculum	0 (0.0)	0 (0.0)	n.s.
Step 5. Healthy food served	5 (62.5)	6 (75.0)	n.s.
Step 6. School meal planning	0 (0.0)	0 (0.0)	n.s.
Step 7. Physical education curriculum	3 (37.5)	3 (37.5)	n.s.
Step 8. Minimum physical activity	1 (12.5)	6 (75.0)	<i>p</i> = .0406
Step 9. School nurse	4 (50.0)	6 (75.0)	n.s.
Step. 10 Health services referral	0 (0.0)	4 (50.0)	n.s.
Step 11. Staff wellness	5 (62.5)	3 (37.5)	n.s.
Step 12. School role models	1 (12.5)	4 (50.0)	n.s.
Step 13. Family/community included	1 (12.5)	6 (75.0)	<i>p</i> = .0406
Step 14. Family/community promote healthy eating	1 (12.5)	6 (75.0)	<i>p</i> = .0406
Step 15. Psychological services	0 (0.0)	4 (50.0)	n.s.

NOTE: Fisher's exact test was used for significance. PA = physical activity.

## ► RESULTS

### **15-Step Model Coherence**

One objective of the pilot study was to determine whether the 15 steps could be completed as a whole in the field. Our expectation was that all schools would attempt to achieve all of the 15 steps in the model. To test this objective, we measured which and how many steps were met at baseline and at the end of the study.

Table 3 details the number and percentage of each step met in the eight schools overall at baseline and at the end point of the study. Seven out of the 15 steps were not assessed to be in place at baseline in any of the 8 schools. Five of the steps showed a statistically significant change in the number of schools that had met the requirement from baseline to study's end. Many of the remaining steps did not achieve statistical significance in change over time even though additional steps were met by the end of study (2, 5, 9, 10, 11, 12, 15). In one case, no change was found (Step 7). Two of the steps (4, 6) remained unmet by study completion. All steps were attempted in each school (data not shown).

### **15-Step Model Feasibility**

Table 4 lists the number and percentage of the steps met by each school at baseline and at study's end. At

baseline, one of the schools had met none of the steps, and three had met one.

All of the schools made gains from baseline to the end of the study in the number of steps they were able to complete regardless of which steps they were. Four of the schools demonstrated a statistically significant change from baseline in the number of steps they were able to meet. The remaining four schools did not achieve statistical significance in change over time even though additional steps were added to those met at baseline at each of the schools. None of the schools met all of the 15 steps.

The ability of schools to meet the steps was distributed unequally among schools at baseline and at the end of the study. For example, on completing the initial self-assessment, School 1 found it met 6 of the 15 steps at baseline. These included administrative support for healthy nutrition and physical activity, a healthy school meal, a physical education curriculum, the required amount of student physical activity, a nurse on campus, and a community promoting healthy eating and physical activity. By the end of the study, this school had met 11 steps, including developing school policy and greater collaboration, health and psychosocial service involvement, staff role modeling, and participation from family and outside community. By contrast, School 8 met none of the steps at baseline but

**TABLE 4**  
**Achievement in Meeting the NFSC**  
**Model 15-Step Environmental Requirements for**  
**Each School From Study Baseline to Study**  
**Completion Based on School Self-Assessments**

<i>Schools</i>	<i>Fall 2003</i>	<i>Spring 2005</i>	<i>Significance Level</i>
	<i>Requirement Met</i>	<i>Requirement Met</i>	
	<i>n (%)</i>	<i>n (%)</i>	
School 1	6 (40.00)	11 (73.33)	n.s.
School 2	4 (26.67)	13 (86.67)	<i>p</i> = .0025
School 3	1 (6.67)	8 (53.33)	<i>p</i> = .0142
School 4	4 (26.67)	5 (33.33)	n.s.
School 5	1 (6.67)	8 (53.33)	<i>p</i> = .0142
School 6	2 (13.33)	10 (66.67)	<i>p</i> = .0078
School 7	9 (60.00)	6 (40.0)	n.s.
School 8	0 (0.00)	4 (26.67)	n.s.

NOTE: Fisher's exact test was used for significance.

completed four by the end of the study, including a written nutrition and physical activity policy, administrative support for healthy nutrition and physical activity, collaboration within the school community, and providing healthy school meals.

## ► DISCUSSION

We were successful in testing the coherence of the 15-step model as whole. Although we assumed that the model would be new to our sample schools, some of the steps were assessed to be in place in some of the schools. All of the schools developed action plans to implement the full 15-step model. All of the schools made progress from their baseline measure. One school met all of the 13 steps that were achievable over the course of this study. This demonstrates the variability among schools in their efforts to meet the full environmental model but also the feasibility of implementing the whole model in the field. Two of the steps remained unmet.

We did learn that completion of the full model was beyond the scope of this study. This can be attributed to model requirements that could only be met at the school district level in this setting. Schools attempted to identify affordable, standardized nutrition education curricula but were unsuccessful, relying on nutrition lesson plans from resources such as the Dairy Council or California 5 a Day that did not satisfy Step 4. A nutrition education curriculum was adopted by the school

district after the completion of the study. Timing was important here. A collaborative relationship with district food services remains an impediment to effecting menu changes within the large centralized kitchen at LAUSD, the second largest school district in the country, responsible for preparing and delivering food to schools. By the end of the study, one school had completed construction of a new campus and planned to contract food services independently for its new kitchen and cafeteria. We speculate that there is nothing inherently unresponsive within a food service system to input into meal planning. In another school district or where schools prepare food on site, this step might have been in place or completed during the study period. We anticipated that schools might have difficulty completing Step 9, the school nurse–student ratio, due to district-level staffing decisions. Surprisingly, most schools were able to meet this step, one of them using project funding to purchase additional nurse hours. Schools were successful in meeting steps close to home. Steps 13 and 14, for example, were met through community outreach, partnering with local agencies to add resources to their school community. These partnerships included the parks and recreation department, neighborhood medical facilities, and local grocery stores and restaurants.

It is difficult to assess the contribution of external liaisons used in this study without appropriate controls. We cannot compare our findings with Austin et al. (2006) regarding the differences in school outcomes based on the influence of varying levels of external facilitation, categorized as low, moderate, or high. Outcomes in these nine New England and Midwest schools were different based on the amount of facilitation available to the schools. The authors feel that facilitation was perhaps responsible for different organizational strategies used by schools to implement the SHI. We are unable to comment on the influence of our external liaisons in supporting different or more complex strategies to complete the model because each school developed a strategy that met their unique school community's capacity with equivalent liaison support. Because our study focused on model implementation rather than the influence of external facilitators, we chose to minimize variability from differential liaison input into the study. Similarly, Staten et al. (2005), in seven Arizona elementary schools, described the use of external coordinators in implementing the SHI, where each school chose a different plan for improving school nutrition regardless of equal support from external coordinators.

Different from the findings in Austin et al. (2006), however, we conclude that implementing our model

through committee formation, collaboration, and sequential self-assessment might have been sufficient to sustain and propel the model forward. Whether this forward momentum can be attributed to the liaisons in furthering an organizational strategy, as Austin did, is unknown here. We must conclude, therefore, that the influence of the facilitator in our study may be just one force in moving a school beyond its baseline assessment. The design of the model itself may have contributed in some part to the progress each school was able to make.

As indicated in Austin et al. (2006), use of self-reporting to substantiate implementation is less desirable than observation and other methods of documentation. Our school liaisons compiled a case study report based on their observations of the self-assessment process, school achievements, and lessons learned during the project period that lend additional credence to our findings. The lessons learned acknowledged time constraints from standardized testing, the value of administrative support and a team approach, and enlisting the help of local community partners. A full account of the school liaison observations is available in Vecchiarelli et al. (2006).

Our ability to induce schools to participate in the implementation of an entire model can be compared to Brener et al. (2006) in evaluating national progress in completing SHI modules using school health policies and programs study (SHPPS) data. Brener et al. found that work on SHI modules is distributed across schools with no one school addressing all modules or all items in a module. Rather, sampled schools select a few programs or policies that fit the needs or capabilities of their school. In our work, schools address the model in its entirety and develop an action plan to meet all of the steps regardless of their ability to complete them. The schools had flexibility to decide on the order in which steps were addressed.

As with our model, the intent of SHI is for school teams to form and act as collaborators in developing action plans to address the school deficits. Staten et al. (2005) found that schools where administrators acted alone or outside of a collaborative process were either unable to sustain changes after the administrators left or depended on the institutional memory of the external facilitator to sustain the developmental process. Austin's (2006) finding further supports the notion of a collaborative team approach to action planning and achievement of goals. The schools in our pilot study all formed and retained a committee approach to completing self-assessments, developing their action plans, and achieving model objectives. All but one school achieved administrative support.

## ► CONCLUSIONS

Our findings fulfill our objective to test the coherence and feasibility of implementing, in full, a comprehensive and coordinated model with the potential to change the school environment to promote healthy nutrition and physical activity. Recommendations from this study include testing the viability of using internal school liaisons rather than external liaisons to reduce the cost. Development of a self-guided 15-step NFSC tool kit for school use is planned.

*Limitations.* Regardless of equivalent distribution of school liaisons at all of the study schools, some schools achieved more than other schools in meeting the model steps. This finding may indicate that some barriers to model implementation may be beyond the scope of external facilitation. We cannot account for other factors that may have contributed to implementation of the model. Finally, the generalizability of our study is limited because of the likely variability of district-level constraints on model completion in some areas.

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