



Using Participatory Action Research to Develop a School-based Environmental Intervention to Support Healthy Eating and Physical Activity

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ABSTRACT:

Rates of overweight children and adolescents have nearly tripled over the past 30 years. Many barriers exist to healthy eating and physical activity for children and adolescents, including factors in the school and community environment. It is these modifiable school environmental factors that led to the development of the Nutrition Friendly Schools and Communities (NFSC) model to prevent the development of overweight in children and adolescents. Development of the NFSC model built upon the Coordinated School Health Program, the Baby Friendly Hospital Initiative, Participatory Research, and Empowerment Evaluation. The purpose of the NFSC environmental intervention is to actively engage the school community to prevent overweight in students through a multi-level participative intervention that facilitates coordinated changes in the school environment in the following areas: health education, physical education, health services, food services, school policy, staff wellness, psychosocial services, and family/community involvement. The NFSC model is the basis by which school communities develop a plan and evaluation that lead to a healthy school environment and prevent the development of overweight in children. A pilot study of the NFSC model is currently being conducted in eight low-income, minority, urban schools. This paper describes the development of the NFSC model and criteria.

Rates of overweight children and adolescents are reaching epidemic proportions, nearly tripling over the past 30 years. Many barriers exist to healthy eating and physical activity for children and adolescents, including factors in the school and community environments. It is these modifiable school environmental factors that led to the development of the Nutrition Friendly Schools and Communities (NFSC) criteria and model to prevent the development of overweight in children and adolescents. This paper describes the development of the NFSC criteria and model, which was developed in collaboration with school community stakeholders to support healthy eating and physical activity and decrease the rising rates of overweight children.

BACKGROUND

In the 1999-2002 National Health and Nutrition Examination Survey (NHANES III), it was estimated that 15.8% of children ages 6-11 and 16.1% of adolescents ages 12-19 were overweight.¹ We know that many barriers exist to healthy eating and physical activity. The International Obesity Task Force describes the causes of obesity as a web, with factors of health, global food marketing, media, policies related to food and agriculture, urban design, transportation and constraints for physical activity contributing to the development of overweight and obesity.² Factors such as lack of time to prepare meals, easy access to calorie-dense and prepared foods, lack of access to and affordability of healthier

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foods, such as fresh produce, lack of grocery stores in lower income areas, lack of opportunity for physical activity, which is in part due to a lack of safe space, and increased time spent in sedentary activities such as watching television, playing video games and computer use may prevent people from eating healthfully and being physically active.³⁻⁶

There are several key school environmental factors that may also contribute to the increase of overweight in children including: easy access for students to calorie-dense foods through vending machines, student stores and a la carte lines; nutrition and physical education mandates may not exist or be enforced; nutrition and physical education mandates may not be followed as standardized testing and mandates for other academic subjects are a higher priority; lack of comprehensive, affordable nutrition education and physical education curricula; and insufficient teacher training in nutrition and physical education.^{4,5,7}

The concept for the NFSC model emerged as part of the ongoing collaboration between the Los Angeles Unified School District (LAUSD) Nutrition Network and a research team from the University of California Los Angeles (UCLA) School of Public Health. The LAUSD Nutrition Network was established in 2000 to encourage healthy eating and physical activity for pre-K through 12th grade students. It is funded through the California Department of Health Services, through the United States Department of Agriculture (USDA).⁸ The Nutrition Network provides funding to approximately 200 schools with 50% or more of their students receiving free or reduced meals. The UCLA School of Public Health research team has been working with the LAUSD since 1998 on numerous studies related to nutrition, physical activity and overweight children.

The LAUSD Nutrition Network and the UCLA School of Public Health research team identified developing an innovative strategy for school community stakeholders to become actively involved in the nutrition and physical activity environment of

their schools as a method to improve the school nutrition environment to support healthy eating and physical activity. It was decided that a model combining the Coordinated School Health Program (CSHP), the Baby Friendly Hospital Initiative (BFHI), and Participatory Research (PR) could provide school community stakeholders the overarching structure to address nutrition and physical activity on their campus by building on existing strengths.

The purpose of the NFSC environmental intervention is to actively engage the whole school community to prevent overweight in elementary school aged children through a multi-level participative intervention that facilitates coordinated changes in the school environment in the following areas: nutrition education, physical education, health services, food services, school policy, staff wellness, psychosocial services and family/community involvement. Four models form the basis for the structure and implementation of the NFSC model.

GUIDING MODELS FOR NFSC

Coordinated School Health Program

The CSHP developed by Kolbe and Allensworth addresses eight components of school health including: health education, physical education, health services, food services, school environment, staff wellness, psychosocial services and family/community involvement.^{9,10} These eight components together form an ecological framework not only to prevent overweight in children, but also to intervene with already overweight students. The CSHP model addresses the entire school environment in overweight and obesity prevention. To date, much has been written about the potential benefits of the CSHP model; little research has been conducted to test whether, when fully implemented, this eight-component model is actually successful in changing the school environment and if it impacts childhood overweight. In a pilot study in Florida, it was found that all eight components of the CSHP could be implemented with strong financial support.¹¹ However, there were no individual measures collected to

determine if implementation of the CSHP impacted student health behaviors. Additionally, a pilot study of middle schools in San Diego of a partially implemented CSHP with the food service, physical education and policy components found a significant difference in increased physical activity over time compared to control schools.¹² The NFSC model incorporates all eight components of the CSHP.

Baby Friendly Hospital Initiative

The BFHI is a hospital-initiated project of the United Nations Children's Fund and the World Health Organization aimed at increasing breastfeeding rates and establishing an international standard for lactation services in maternity hospitals. Maternity hospitals recognized as Baby Friendly have implemented the Ten Steps to Successful Breastfeeding that form the basis of the BFHI. Each of the Ten Steps is research and evidence based (Baby Friendly USA, 2002).

Over 16,000 hospitals worldwide have been designated as BFH with subsequent results of increasing breastfeeding rates, decreasing illness and saving money.^{13,14} The establishment of standardized, minimum criteria for NFSC certification is modeled on the BFHI approach.

Participatory Research and Empowerment Evaluation

Through participatory research, the school community members and research team share in the decision-making process as opposed to the researchers making all decisions and asking the school community members for input after decisions have already been made. There are different levels of participatory research with the community stakeholders and researchers adopting different, complementary roles throughout the process.¹⁵ The NFSC model operates on the collaborative level with both the school community and research team contributing their areas of expertise in this process. School community stakeholders identified overweight, poor nutrition and physical activity of students as important health issues to be addressed and requested the research team assist in working towards a



solution. These school community stakeholders and the research team developed, in collaboration, the NFSC model to address these student health issues.

Finally, empowerment evaluation is focused on assisting people or groups to help themselves and improving programs through self-evaluation and reflection.¹⁶ In this type of evaluation, the program's goals and outcomes become part of a larger ongoing process of improvement. Empowerment evaluation is necessarily a collaborative process involving stakeholders as well as assistance from outside evaluators. The NFSC model includes a self-evaluation that school community stakeholders conduct and continually revisit to determine the progress towards meeting their goals.

THEORY

The NFSC model is conceptualized as a participatory, environmental intervention to prevent the development of overweight in school-aged children. Three theoretical models guide the development of NFSC.

Ecological

The overall theoretical umbrella for this research is the ecological model developed by Urie Bronfenbrenner, which proposed four levels of environmental influence (microsystem, mesosystem, exosystem and the macrosystem) that interact to change health behavior.¹⁷ The NFSC model focuses on all four levels of the environment. At the microsystem level, peers, coworkers and family members will provide a support system for the students, staff and parents as they participate in NFSC programs and activities. The NFSC involves changes in the school environment (mesosystem) that makes it more conducive to supporting healthy behavioral changes by students, staff and parents. At the exosystem level, as individual school policies and environments begin to change to be supportive of healthy eating and physical activity, this will lay the groundwork for a potential change in the entire LAUSD system to support healthy behaviors among school students, staff and parents to prevent the development of over-

weight and obesity. Finally, at the macrosystem level, the potential positive impact of these changes in the school environment will be conveyed to local, state and national policymakers to encourage their support in this type of systemic change to support healthy eating and physical activity in our schools.

Social Cognitive Theory

Social Cognitive Theory (SCT), also known as Social Learning Theory, also guides the NFSC model.¹⁸ SCT is based on the belief that a person's interactions of personal behavior, personal cognitions and environmental influences will lead to behavioral change. These three variables are constantly changing and interacting to influence dietary and physical activity behaviors. The NFSC model will influence multiple components including student, school environment, parents and policies to change nutrition and physical activity behavior to prevent overweight and obesity. By influencing nutrition and physical activity knowledge, attitudes, access and availability, specifically, we expect to see a change in behaviors (for example, increased fruit and vegetable consumption and increased physical activity) that lead to overweight and obesity prevention.

Social Support Theory

Finally, Social Support Theory (SST) recognizes the important role of social interaction and social support in influencing health status.¹⁹ In any group intervention, but particularly one that incorporates a participatory process, the group environment becomes part of the intervention. Thus, an environment that fosters support can be a crucial element in the success of the intervention. Social support has the potential to move participants to the action phase of change, and to assist in reinforcing positive behavioral change. On a more global level, the established supportive relationships between the schools, the LAUSD Nutrition Network and the UCLA School of Public Health research team should contribute toward building trust and a successful continued collaboration. By involving all school

community stakeholders, a network of support is built to improve the health behaviors of the school community stakeholders.

CRITERIA DEVELOPMENT FOR NUTRITION FRIENDLY SCHOOLS AND COMMUNITIES

In the NFSC model, school community stakeholders develop a process, plan and evaluation tool that lead to a healthy school environment and to prevent the development of overweight in children. The NFSC model was developed through a participatory process involving school community stakeholders. First, the LAUSD Nutrition Network and UCLA School of Public Health research team identified groups of stakeholders as well as individuals within the stakeholder groups to participate in work group meetings to develop the NFSC criteria and model. Stakeholders included teachers, food service staff, administrators, health service staff and parents from elementary schools participating in the Nutrition Network. Additionally, district level staff involved with academics, health services, physical education, food services, after-school programs, parent organizers and administrators were also identified. Approximately 220 invitations were mailed and over 100 school community stakeholders participated in the development of the NFSC model including the criteria and self-evaluation tool.

In spring 2002, three meetings were held with the participating school community stakeholders. These first introductory meetings were designed to introduce the stakeholders to the NFSC concept and to provide the groundwork for the development of the NFSC criteria and process. During these introductory meetings, participants were asked to brainstorm elements of an ideal school environment to support healthy eating and physical activity. Following the BFHI 10 Steps for Successful Breastfeeding, criteria were developed around each of the eight components in the CSHP as standards of school community practice to prevent overweight and promote healthy eating and physical activity in

**Table 1. 15 Steps to a Nutrition Friendly School and Selected Supporting Evidence**

Criteria	Supporting Evidence
1. The school has written physical activity and nutrition policies that are followed.	(Baranowski, et al., 1997; Centers for Disease Control and Prevention, 1996; United States Department of Health and Human Services, 2001; Wechsler, et al., 2000) ^{25,26,27,7}
2. The school administration supports efforts to promote healthy eating and physical activity among all school community stakeholders including staff, students and families.	(United States Department of Health and Human Services, 2001) ²⁵
3. There is 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.	(Jackson, Dietz, & Sanders, 2002) ²⁸
4. The school has a standardized nutrition education curriculum that is integrated into other school subjects including language arts, math, science and social studies.	(Harrell, et al., 1998; Luepker, et al., 1996; Simons-Morton, Parcel, Baranowski, Forthofer, O'Hara, 1991; United States Department of Health and Human Services, 2000) ^{27, 29 - 31}
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 snacks.	(Luepker, et al., 1996; Simons-Morton, et al., 1991; United States Department of Health and Human Services, 2000) ^{30,31,27}
6. The school staff and students have input into school meal planning.	
7. The school has a physical education curriculum/program that is adhered to by a minimum of 80% of eligible staff.	(Baranowski, et al., 1997; Harrell, et al., 1998; Luepker, et al., 1996; Simons-Morton, et al., 1991; United States Department of Health and Human Services, 2000) ^{25,29,30,31,27}
8. A minimum of 85% of classrooms participates in a minimum of 20 minutes of moderate to vigorous daily physical activity.	

schools. After these three large group meetings, participants were invited to attend work group meetings. Several work group meetings were held for each of the eight components of the CSHP. School community stakeholders were asked to attend a work group in an area that was of interest to them or in which they had expertise. The work groups developed measurable and specific criteria for each of the respective components.

Using a modified Delphi process, participating stakeholders identified the top criteria, which became the 15 Steps to a

Nutrition Friendly School (Table 1). An explanatory letter and questionnaire were sent out to all participating stakeholders to rank order the potential criteria for each CSHP component. The questionnaire included potential criteria developed in meetings and work groups, which were corroborated with Healthy People 2010 objectives and the US Department of Health and Human Services recommendations.²⁰ Participants ranked the criteria in each of the eight CSHP areas (nutrition education, physical education, health services, food services, school environment, staff

wellness, psychosocial service, and family/community involvement). The top choices from each area were then selected as the final NFSC minimum criteria. Once the minimum criteria were established, supporting evidence was gathered for each one (Table 1). This supporting document provides research-based evidence to demonstrate the potential impact for each criterion. During this review, more research was found to support some of the criteria than for others. For example, a wealth of research was available for Steps 7 and 8 regarding physical activity and Step 13 on the subject



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| 9. The school has one nurse for every 750 students. | (Baranowski, et al., 1997; United States Department of Health and Human Services, 2000) ^{25,27} |
| 10. School Health Services identifies and refers students with nutrition and physical activity issues within 5 days of initial contact. | (Baranowski, et al., 1997) ²⁷ |
| 11. The school has a staff wellness program that is offered to all staff that promotes healthy eating and physical activity. | (Allegrante, 1998; United States Department of Health and Human Services, 2000) ^{32,27} |
| 12. The school staff is committed to serve as role models for healthy behavior. | (Allegrante, 1998) ³² |
| 13. The school includes family and community members in nutrition education and physical education. | (Luepker, et al., 1996; Sallis, et al., 1997) ^{30,33} |
| 14. Family and community members actively promote healthy eating and physical activity. | (Tibbs, et al., 2001) ³⁴ |
| 15. School Psychosocial Services supports healthy eating and physical activity. | (Armbruster & Lichtman, 1999) ³⁵ |

of family and community involvement. However, little research was found for Steps 9 and 10 concerning school health services and no research was found for Step 6 regarding school community input into meal planning. This supporting document will be revised and updated as current research, which provides evidence for each of the 15 Steps is published.

SELF-EVALUATION TOOL

After criteria selection, a self-evaluation tool was developed. Here, the NFSC model seeks to provide schools with a minimum foundation upon which they can build to determine the additional criteria appropriate for their individual school environment to be certified as Nutrition Friendly. The UCLA research team used the Centers for Disease Control and Prevention's (CDC) *School Health Index* and the USDA's *Changing the Scene* to guide the development of the self-evaluation tool.^{8, 21} Additionally, input was sought from the stakeholders who had used either of these instruments in their practice. Feedback from these stakeholders and from the LAUSD Nutrition Network suggested that a user-friendly tool with user input into the development was needed.

With these suggestions, the research team created the NFSC self-evaluation tool (Figure 1). The NFSC self-evaluation tool is similar to the CDC's *School Health Index* with its focus on the CSHP and the USDA's *School Improvement Checklist* with fewer criteria and a focus on additional components in the school environment including health services, physical activity and psychosocial services. The NFSC self-evaluation tool is specific to the 15 Steps and provides guidance for schools in determining specific actions that may be taken to achieve each step.

The instrument was pre-tested in elementary schools with groups of teachers, administrators, food service staff and nurses. The purpose of the pre-test was to determine if school community stakeholders would be able to complete the self-evaluation in a timely manner, if the tool was easy to understand and follow, if any additional items needed to be added or if any items needed to be removed. The tool includes each of the 15 Steps and its purpose is to assist schools in determining which criteria have already been achieved, which criteria could be improved upon to become NFSC certified, and plans for meeting each of the 15 Steps.

NFSC PROCESS NEXT STEPS

As a result of the formative work with the school community stakeholders, the research team applied for and received funding from the CDC through its Community Based Participatory Research to conduct a three-year pilot study of the NFSC model in eight urban, minority elementary schools. One of the goals of this pilot study is to determine if the NFSC model including the 15 Steps can feasibly be implemented on school campuses. Student and adult nutrition and physical activity knowledge, attitudes and behavior baseline data have already been collected. Each of the intervention schools has formed a committee of school community members including parents, teachers, staff and students to guide the process. The committees, with the assistance of the research team, conducted self-evaluations to determine which criteria they have met and which criteria they will work towards. Then, the committees developed a plan to address these standards. This plan is unique to each school and builds upon the strengths and programs already in place to support healthy nutrition and physical activity. Implementation of the plans and self-assessment will be ongoing with continuous feedback to assess



Figure 1. Nutrition Friendly Schools and Communities Self - Evaluation Tool Sample

Criteria	Yes	Partial	No	Don't Know	If response is "yes," describe	If response is "no" or "partial," describe what actions are planned
School Environment and Policies						
<p>Step 1: The school has written physical activity and nutrition policies that are followed.</p> <ul style="list-style-type: none"> * A written copy of the policy is available to all school community stakeholders. * All school community stakeholders have input into the development of policies. * Adherence to policies is monitored. * School fund-raising efforts support healthy eating and physical activity. 	—	—	—	—		
<p>Step 2: The school administration supports efforts to promote healthy eating and physical activity among all school community stakeholders including staff, students, and families.</p> <ul style="list-style-type: none"> * The school administration allows time throughout the day for nutrition education, physical education and staff wellness. * School community stakeholders are encouraged to participate in nutrition education, physical education and staff wellness opportunities. * Junk food is not sold for fundraising. * Alternatives for fundraising are identified. 	—	—	—	—		



and adjust the plan as needed. Results from this baseline data will be reported in a separate paper.

After a school has implemented their NFSC plan and feel they have met all of NFSC criteria, they will request a review, which will be conducted by a set of trained external evaluators. If the evaluators assess that a school has met all the criteria, the school will be Nutrition Friendly certified. This certification criteria and tool is currently being developed and its development will be based on the criteria developed for the self-evaluation tool. In addition, external evaluators including specialists in each of the eight components of the CSHP will be trained to conduct these assessments. As the BFHI is held in high regard by hospitals, governments and families throughout the world, it is anticipated that the Nutrition Friendly certification will be highly valued by families, policymakers, and school administrators.

DISCUSSION

Several studies have shown a link between nutrition and academics.²²⁻²⁴ Therefore, schools cannot ignore the increasing numbers of overweight students, poor nutrition and lack of physical activity among students. The NFSC model is an environmental approach that involves all school community stakeholders in improving the entire school environment to support healthy nutrition and physical activity. In this environmental model, the whole school community is targeted to improve nutrition and physical activity behaviors—not just overweight students.

The development of the NFSC certification process adapted important steps and lessons learned from the CSHP and BFHI. The NFSC certification process includes a set of 15 standards that are evidence based and developed by school community stakeholders. As in the BFHI where the hospital is a central player in increasing breastfeeding rates, the school becomes the central player in the NFSC model to improve dietary and physical activity behaviors.

From the beginning, this process actively

involved school community stakeholders including teachers, administrators, food service staff, health service staff, parents and community members. The research team views the fact that over 100 stakeholders participated in the NFSC development as a great success. One of the main strategies in participatory research is to involve the community in defining the problem, identifying solutions and evaluating the progress. This participatory nature will continue to be the foundation of the NFSC model as each school works toward becoming a NFSC school.

While this pilot study will only be implemented in elementary schools if the model proves to be feasible, it can be adapted to additional schools including pre-school, middle, junior and high schools, and other environments including workplace and hospitals. This participatory, environmental approach to overweight prevention has the capability to positively alter a school environment to empower the school community as well as change student, staff and community knowledge, attitudes and behavior to prevent the development of overweight in children.

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Erratum

Editor's Note

We regret that an error has occurred in the listing of the manuscript reviewers from the previous year. The following reviewer was accidentally excluded:

Judy Drolet, PhD, CHES
Southern Illinois University Carbondale