

Pilot Implementation of the Improving Children’s Health through Farming, Food, and Fitness program in select California schools

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Please note that this study was published before the implementation of Healthy, Hunger-Free Kids Act of 2010, which went into effect during the 2012-13 school year, and its provision for Smart Snacks Nutrition Standards for Competitive Food in Schools, implemented during the 2014-15 school year. As such, certain research may not be relevant today.

ABSTRACT

Objectives

The purpose of this pilot project was to evaluate the effect of the Improving Children’s Health through Farming, Food, and Fitness Program (CHF3) on the dietary knowledge and habits of participating children.

Methods

The CHF3 program aims to 1) establish salad bars and integrate nutrition messages into cafeteria activities; 2) develop and incorporate education curricula and activity guides that link program components to the education Content Standards for California Public Schools by subject and grade; 3) integrate a garden “laboratory” with nutrition education to improve children’s knowledge of nutrition and improve their food choices; and 4) develop a food-waste composting system in an effort to reduce the lunch waste stream and engage students in the ongoing practice of recycling. This program was implemented in kindergarten classrooms at Rock Creek Elementary School in Auburn, California (n = 32 students) and fourth and fifth grade classrooms at American Union Elementary School in Fresno, California (n = 51 students).

Results

Our findings demonstrate that the CHF3 Program can increase awareness about the importance of proper nutrition and exercise among students, teachers, and staff while increasing nutrition knowledge and improving lifestyle choices.

Application to Child Nutrition Professionals

Other professionals may find their obesity prevention efforts to be more effective if they use a multi-faceted program like the CHF3 program.

INTRODUCTION

In the past, people were aware of the important role farming played in their lives. Today, however, most people live in urban areas, and although California still has bountiful agriculture, fewer and fewer of its residents are aware of the impact of farming on their lives. Children, especially, have lost touch with how and where food is grown. They lack an understanding of the ecosystems, the land, the people, and even the plants that produce their food (California Department of Education, 2002).

The Centers for Disease Control and Prevention (CDC) encourages creating a school environment that supports regular physical activity and healthy eating habits (Centers for Disease Control and Prevention, 1996; Centers for Disease Control National Center for Chronic Disease Prevention and Health Promotion, 2003). As a result, many school districts throughout California have shown an interest in “stepping out of the box” of traditional teaching methods to incorporate agriculture into the school environment to advocate healthy lifestyle choices (Graham, Beall, Lussier, McLaughlin, & Zidenberg-Cherr, 2005). The incorporation of agriculture into the school curriculum provides an excellent avenue in which to discuss food – where it comes from, its health benefits, how to choose healthy foods, factors contributing to human health, as well as concepts important to planetary health, such as composting and recycling.

Our pilot study was a multi-site pre-test, post-test design investigation aimed at evaluating the use of the Improving Children's Health through Farming Food and Fitness (CHF3) Program that incorporates agriculture into the school environment. In this project, we created a school setting that moved beyond the academic role to create an environment that linked healthy lifestyles at school with that among families and communities as one step to improve child health and reduce childhood overweight and obesity.

Specifically, the objectives of the CHF3 program were to: 1) establish salad bars and integrate nutrition messages into cafeteria activities; 2) develop and incorporate education curricula and activity guides that link program components to the education Content Standards for California Public Schools (California State Board of Education, 1997a, 1997b, 1997c, 1997d) by subject and grade; 3) integrate a garden "laboratory" with nutrition education to improve children's knowledge of nutrition and improve their food choices; and 4) develop a food-waste composting system in an effort to reduce the lunch waste stream and engage students in the ongoing practice of recycling.

It was hypothesized that this work would provide additional evidence in support of comprehensive school programs that integrate nutrition and agriculture into school curricula.

METHODOLOGY

This pilot intervention targeted kindergarten children attending Rock Creek Elementary School in Auburn, California (n = 32) and fourth and fifth grade children attending American Union Elementary School in Fresno, California (n = 51). Both schools were eligible for participation in the California Food Stamps Nutrition Education Program (= 50 % of children eligible for free and reduced lunch). Components of the Community Based Participatory Research (Israel, Schulz, Parker, & Becker, 1998) model were used in program implementation, which differed slightly at each location to accommodate the unique needs of both schools.

Rock Creek Elementary School: Auburn, California

Prior to project implementation, a curriculum appropriate for kindergarten children was created. Ten lessons were pilot tested in Placer County after-school programs serving kindergarten children and any necessary revisions were made. Binders were prepared for each participating teacher and an orientation meeting was held for the parents. Concurrently, a salad bar was set up and the cafeteria manager was briefed on food safety issues and how the salad bar offerings could support the classroom nutrition lessons. The salad bar, which contained both meat and vegetable options, became a regular part of school meals for four months. During this four month period, University of California Cooperative Extension (UCCE) staff also delivered two hours of nutrition education lessons per week. When the lessons were completed, Placer County UCCE, with assistance from community members, held a "Fit Kid Fun Fair" at the school. During this event, the children completed various physical activity events that had a nutrition focus such as coconut bowling and melon weightlifting, tasted foods from a local grower, and planted seedlings with a UC Master Gardener.

American Union Elementary School: Fresno, California

Prior to implementation of the CHF3 program, an orientation session was held with teachers and staff during which planning for program implementation was discussed. During the active phase of the program, the salad bar was added to the lunch menu options. Initially, only children receiving nutrition lessons were able to partake in the salad bar; however, demand caused the foodservice staff to prepare enough of the salad bar vegetables and fruit for all of the children. Also upon program initiation, UCCE staff delivered lessons from Nutrition to Grow On (Morris, Shaw, & Zidenberg-Cherr, 2001), a curricula developed by our research group for 4th through 6th grade children. The children received one hour of nutrition and gardening lessons per week for ten weeks. When the lessons were completed, Fresno UCCE hosted a physical activity event for the fourth and fifth graders which focused around agriculture and nutrition.

Assessment

The effectiveness of the CHF3 program was evaluated using the following tools:

1. Perceptions of the CHF3 Program were documented in journals and staff interviews.
2. Perceptions of the CHF3 Program were also assessed post-program initiation through staff surveys.
3. The effect of the CHF3 Program on parent perceived behaviors of their children was compared pre- and post- program initiation through a survey (Morris, Koumjian, Briggs, & Zidenberg-Cherr, 2002). The Parent Nutrition Survey included questions on the dietary habits, snack choices, and physical activity behaviors of children.

- The nutrition knowledge of participating students was assessed using a pre- and post-test (Morris & Zidenberg-Cherr, 2002). The Child Nutrition Survey had questions pertaining to the nutrition lessons and was curriculum specific.

Data from the *Parent Nutrition Surveys* and *Child Nutrition Surveys* were coded as nominal variables. The effects of the CHF3 program on the nutrition knowledge and behavior of children were determined using paired t-tests. The confidence interval was set at 95%. All analyses were completed using SPSS 11.5 for windows (SPSS Inc. 2004, Chicago, Illinois).

RESULTS AND DISCUSSION

Demographics

Eighty-three children and their parents/guardians participated in the evaluation. Thirty-nine percent of the children attended Rock Creek Elementary School (n=32) and sixty-one percent attended American Union Elementary School (n=51). Thirty-nine percent were kindergarteners (n = 32), eighteen percent fourth graders (n = 15), and forty-three percent fifth graders (n = 36). Thirty-four percent of the children were male (n=28) and sixty-three percent were female (n=52). Three percent of parents/guardians did not report their child's gender (n=3). Nine percent of the children were identified as of a race other than African American, American Indian/ Alaska native, Asian/ Pacific Islander, Caucasian, Chicano, or Latino (n=7); forty-two percent as Latino (n=35); thirty-four percent as Caucasian (n=28); one percent as Asian/ Pacific Islander (n=1); and two percent as African American (n=2). Eleven percent of parents/guardians did not report their child's ethnicity (n=10). Finally, sixty-one percent of parents used English assessment materials (n = 51) and thirty-nine percent used Spanish (n = 32).

Journals and Interviews

A journal kept by a foodservice director at Rock Creek Elementary School indicated that the CHF3 Program encouraged students to try new foods such as jicama, baby carrots with tops, grapefruit, blood oranges, granola, and tofu and that the acceptance of all these novel foods was high. In her journal, a garden coordinator indicated that children of all ages were recycling their lunch waste for use in composting by depositing it in appropriate bins as a result of CHF3 Program training. Furthermore, the garden coordinator indicated that avid composters encouraged their peers to compost as well.

Interviews with teachers revealed the assets of the CHF3 Program, barriers to its implementation, and potential solutions to these barriers (Table 1). Furthermore, teachers felt there were several steps that should be taken to ensure that the CHF3 Program was sustainable. These included 1) taking steps to maintain interest in nutrition and physical activity among the students, possibly by including information regarding career opportunities in agriculture; 2) suggestions that UCCE create a grade specific curriculum that builds on itself; 3) provision of copies of the health standards and the Nutrition Competencies and Grade Level Expectations (available at <http://nutrition.ucdavis.edu>) to teachers; 4) installation of a garden drip irrigation system by the school to make maintenance easier; 5) harvesting vegetables from the garden to use in the salad bar; 6) providing opportunities for older students to assist in the preparation of fruits and vegetables for the salad bar; 7) assisting teachers with submission of grant applications to get additional funding to support the program. (Specifically, teachers would like UCCE to supply them with a list of grant opportunities); 8) using seedlings, rather than seeds, in the garden. (Although they believe that the children should have the opportunity to see some seeds grow into plants, it was too time consuming to plant the seeds in the garden); and 9) suggestions that UCCE Master Gardeners provide a list of summer and winter crops that is appropriate for their area and for the Master Gardeners to visit the school at the beginning of the year to assist in the garden set up.

Table 1. Findings from interviews with Teachers (N=6)

<i>Program Assets</i>
The CHF3 program is well rounded and considerate of time.
The CHF3 program allows children to participate in healthy activities without feeling stressed.
The CHF3 program has a salad bar.
The CHF3 program includes classroom gardening activities.

<i>Barriers to Program Implementation</i>	<i>Potential Solutions to Barriers</i>
The CHF3 program requires extra time.	Dividing the classroom into two groups so that activities can be completed simultaneously should help to decrease the time needed to complete the CHF3 program activities.
Inclement weather makes it difficult to complete the CHF3 program gardening activities.	The CHF3 program could have more indoor gardening activities.
The CHF3 program requires extra money.	The CHF3 program could assist teachers in applying for additional funding from organizations such as Healthy Sprouts.

Staff Survey

Several school staff members completed the staff survey (n=6). Comments include that the CHF3 Program was, “opening a window for the children;” that, “students enjoyed trying all the new foods;” that students participating in the CHF3 Program, “like[ed] the new veggies and fruit each week and all are trying things for the first time and learning so much;” that the CHF3 Program made students feel, “happy because of our salad bar;” that, “[students] now realize how important it is to be active, eat healthy, and learn about the food we eat;” and that students “enjoyed the program.”

Parent Nutrition Survey

Results from the *Parent Nutrition Survey* showed that in comparison to the beginning of the intervention, at the end of the intervention, elementary school kindergarteners significantly decreased both their consumption of soft drinks (p=0.041) (60% vs. 35% yes) and their computer use (p=0.011) (0.81 hours vs. 0.33 hours). In addition, fourth and fifth graders participating in the CHF3 Program significantly increased their consumption of fruits (p=0.044) (88% vs. 97% yes) and decreased their consumption of cookies (p=0.000) (88% vs. 56% yes).

Child Nutrition Survey

Results from students who completed the Child Nutrition Survey show that the CHF3 program is effective at increasing the nutrition knowledge of kindergarteners. Four months after implementation of the CHF3 Program, significant increases were observed in the number of children who knew that MyPyramid is a tool to assist with dietary choices (p = 0.022) (77% vs. 100% correct), what plants need to grow (p = 0.031) (71% vs. 92% correct), why milk is important (p = 0.003) (48% vs. 79% correct), and that dancing, not computer use or television watching is a form of exercise (p = 0.031) (52% vs. 75% correct) (Table 2).

Results also show that the CHF3 Program is effective at increasing the nutrition knowledge of fourth and fifth graders. Statistically significant increases in the Child Nutrition Survey scores were observed (p= 0.000) (66% vs. 80% correct). Specifically, significant increases were observed in the number of children who knew what foods are flowers (p = 0.003) (64% vs. 88% correct), what nutrients provide our bodies with energy (p = 0.000) (28% vs. 65% correct), why our bodies need calcium (p = 0.006) (72% vs. 94 % correct), how many food groups were in a sample meal (p = 0.017) (60% vs. 84 % correct), MyPyramid messages about grains (p = 0.031) (76% vs. 90 % correct) and vegetables (p = 0.044) (86% vs. 94 % correct), what measuring your pulse tells you (p = 0.005) (76% vs. 92 % correct), that running is a form of aerobic exercise (p = 0.000) (26% vs. 70% correct), what an example of a healthy goal is (p = 0.033) (78% vs. 92% correct), and how a food company might try to entice you to buy their food (p = 0.032) (76% vs. 92% correct) (Table 2).

Table 2. Responses to Child Nutrition Survey

Question	Percent Change In Correct Responses	Significance
<i>Kindergartners (n= 32)</i>		
1. What reminds us to choose good foods to eat?	23%	0.022*

2. Grains group foods are important because they give us?	7%	0.491
3. Circle one thing a plant needs to grow.	21%	0.031*
4. Why do we use a recipe?	10%	0.103
5. Choose one meat and beans group food that comes from plants.	14%	0.096
6. Which food is the root of the plant?	14%	0.203
7. Drinking milk is important because it gives us...	31%	0.003*
8. What should we do before we cook or eat?	18%	0.057
9. Circle the picture where a child is exercising.	23%	0.031*
10. Which food grows on a tree?	-5%	1.000
<i>Fourth and Fifth Graders (n= 51)</i>		
1. Which part of the plant are we eating when we eat spinach?	-2%	0.569
2. Which of these foods is an example of a flower that we eat?	24%	0.003*
3. Which of the following nutrients provides our body with energy?	37%	0.000*
4. Our bodies need calcium to...	22%	0.006*
5. How many different food groups did this student eat from during lunch?	24%	0.017*
6. A smoothie has strawberries, yogurt, and orange juice. How many food groups does this snack have?	11%	0.159
7. When choosing food from the grain group....	14%	0.031*
8. When eating vegetables, you should remember to....	8%	0.044*
9. What do calories measure?	14%	0.051
10. Which of the following is a low-fat healthy snack?	14%	0.057
11. What kind of exercise am I doing when I pick up a heavy shovel while working in the garden?	-1%	0.811
12. If you measure your pulse, you will find out...	16%	0.005*

13. Which of the following is a type of aerobic exercise?	44%	0.000*
14. Which of the following is an example of being physically active?	-4%	0.659
15. Which is a healthy goal?	14%	0.033*
16. What might a food company do to get you to buy their food?	16%	0.032*
17. When making your own snacks at home, what are some good rules to remember?	6%	0.252

* denotes significance at 0.05 level (2-tailed).

Discussion

A recent Institute of Medicine report examined the behavioral and cultural factors, social constructs, and broad environmental issues involved in childhood obesity (Institute of Medicine, 2005). The report called for collaborative approaches to improve the proportion of children meeting the Dietary Guidelines for Americans, and established the school setting as a priority for creating a healthy environment, including coordinated changes in curricula and innovative approaches to teaching nutrition and reducing sedentary behaviors. Other organizations, such as the American Dietetic Association and the Centers for Disease Control and Prevention also encourage creating a school environment that supports regular physical activity and healthy eating habits (Centers for Disease Control and Prevention, 1996; The American Dietetic Association, 2006).

Consistent with these recommendations, the Child Nutrition and WIC Reauthorization Act was amended in June, 2004. One mandate set by this renovated Act required school boards and districts to develop wellness policies by the 2006-2007 school year. Many schools were thus faced with the tremendous challenge of developing a wellness policy without the expertise of health professionals. As a result, policies may be based on inaccurate information, may be fragmented, and may vary from district to district. Nor is there any assurance that the policies utilize a sustainable multifaceted approach. The creation of a versatile program that can be maintained by school or district administrators has proven to be difficult (Caballero, 2004; Story et al., 2002). The CHF3 Program described in this report may provide one solution to this problem.

CONCLUSIONS AND APPLICATIONS

Agricultural, nutritional, and environmental literacy have surfaced as important next steps in creating a community climate that supports the concept of improving children's health (Desmond, 2004). In this pilot study, we created, implemented, and evaluated the CHF3 Program that promoted individual and community health through the school cafeteria, nutrition education, school gardening, and waste management, while incorporating agriculture into multiple aspects of the school environment. The environment was used as the focal point for learning, as environmental-based learning has been shown to be an effective route for enhanced learning, resulting in higher grades and improved standardized test scores (Lieberman & Hoody, 1998). The results from our investigation demonstrate that altering the school environment to create an environment that links healthy lifestyles at schools with that among families and communities can be one step toward improving children's health and dietary habits. Our findings show that the CHF3 Program can be a successful means by which to increase awareness about the importance of proper nutrition and physical activity among the students, teachers, and staff; increase nutrition knowledge; and improve dietary and lifestyle choices. Indeed, the literature supports the role of coordinated programs such as the CHF3 Program as effective means by which to positively alter student's health behaviors and attitudes (Caballero et al., 2003; Luepker et al., 1996; McAleese & Rankin, 2007; Morris & Zidenberg-Cherr, 2002; Veugelers & Fitzgerald, 2005).

As noted previously, barriers to implementation of the CHF3 Program were funding, specifically for a garden/salad bar coordinator and start-up materials. Future investigations that include funding for CHF3 Program implementation in a larger number of schools are needed to determine if the CHF3 Program can be

easily incorporated into the existing structures of a wide variety of schools with diverse needs and be easily sustained by their district and school administrators.

A healthy school environment has the potential to assert a powerful influence on students' dietary behaviors by providing students with the ability to make informed decisions in food choices, possibly altering their lifestyles over time (Graham, Feenstra, Evans, & Zidenberg-Cherr, 2004). Providing nutrition and physical education is an important part of promoting healthy behaviors, working toward the prevention of disease. Other researchers and practitioners may find their obesity prevention efforts in schools to be more effective if they use a multi-faceted program such as the CHF3 Program, and policy makers should consider supporting implementation of such a program.

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