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Strategies to Promote High School Students' Healthful Food Choices

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INTRODUCTION

The purpose of this study was to evaluate the efficacy of a nutrition education curriculum that was developed to inspire new, more healthful dietary habits among adolescents, in order to address the growing public health problem of overweight in youth. Previous garden-based interventions improved attitudes or behaviors related to increased fruit and vegetable intake in pre-adolescent student populations.¹⁻³ In the present garden-to-table curriculum pilot, the authors focus on improving adolescent dietary behavior and attitudes toward healthful food choices by promoting cooking with fresh ingredients and enjoying meals with friends and family.

PROGRAM DESIGN, SETTING, AND THEORETICAL FRAMEWORK

The Diet for a Healthy Planet with Teen Battle Chefs curriculum was based on Social Cognitive Theory⁴ and the social ecological model,⁵ both of which emphasize how behavior, personal factors, and environmental influences interact.⁶ FamilyCook Productions developed a daily, 19-week, ninth-grade curriculum to address nutrition-related attitudinal and behavior changes. The curriculum addresses New York state

educational standards for high school and intermediate school. State Learning Standards addressed for intermediate school are Youth Development; Nutrition; Skills Empowerment; Career Exploration; Life Skills; Life & Environmental Science; Cultural Tolerance. For high school, they are the same as above, plus Food Systems; Civic Empowerment.⁷

Details of curriculum themes and course activities can be found in the Table. The program aims to build high school students' skills related to cooking and growing food while presenting opportunities for students to gain insight into food production and marketing, as well as how environmental and personal factors can create barriers to or opportunities for good nutrition. The present intervention strategies included: skill development, experiential learning activities (eg, photovoice,⁸ video, neighborhood food assessments) and personal nutrition challenges (students' reflective diaries of changes made and how the changes affected their mood). FamilyCook trains classroom teachers to teach the program to enhance its sustainability potential.

The authors applied Social Cognitive Theory in the curriculum design (Table). In-class activities—classroom lecture, inquiry-based problem-solving activities, and weekly development of gardening and/or cooking skills—are designed to increase students' knowledge, build skills, and raise students' self-efficacy for prepar-

ing healthful snacks and meals and identifying good food choices (eg, freshly grown fruits and vegetables, whole grains, and minimally processed foods) over processed and pre-packaged food. Students are asked to reflect on how to improve healthful food options in their school and community environment via menu changes and use of community gardens and farmers markets.

Evaluation Design

The Reach, Efficacy, Adoption, Implementation and Maintenance (RE-AIM) model served as the evaluation framework for the project.⁹ This study's Reach focused on the penetration by grade level and the demographic characteristics of the participating students.

Program Efficacy was evaluated using both quantitative (pre- and posttests) and qualitative measures (culinary skills assessments, focus groups, reflective exercises, etc.). Pre- and post-intervention dietary behaviors were evaluated using 15 selected items from the Centers for Disease Control and Prevention's Youth Risk Behavior Survey.¹⁰ These items include: fruit juice, fruit, green salad, potatoes, carrots, other vegetables, hamburger, hot dog, fried chicken, sausage, green leafy vegetables, soda or pop, milk, and sweet and salty snacks. The score for each item ranged from 0 (not consumed in the past week) to 6 (consumed 4 times per day), with a total potential score of 72. Food of low nutritional quality (eg, soda, sweet and salty snacks) were reverse scored. Also included in the student pre- and post- surveys were items related to attitudes about snacking, cooking, meal preparation, and frequency of meals enjoyed with friends and family. Additionally, student evaluation included assessment of culinary skills and culinary performance based on observation of the

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Table. Diet for a Healthy Planet with Teen Battle Chefs: Weekly Theme Descriptions

Theme	Key Topics Covered	Component of the Theory the Theme Addresses	Anticipated Outcome-Students will:
1. What Influences My Diet?	Body image; general nutrition information; recipe: quesadillas	Knowledge	<ul style="list-style-type: none"> Express awareness of body image Increase ability to discern food choices and behaviors
2. Where to Find Reliable Information on Nutrition	Nutrition information resources; eating by color; recipe: Caribbean salsa	Self-reflection: students realize there are multiple ways to obtain healthy food and are motivated to try new options	<ul style="list-style-type: none"> Identify perceived barriers to obtaining and cooking healthy food Develop awareness of where to find nutrition information Develop strategies for obtaining healthy food choices Identify new sources and types of fresh fruits and vegetables
3. Becoming a Smart Consumer	Health claims; healthy snack: edamame	Intentionality: intentionally buying certain products over others	<ul style="list-style-type: none"> Evaluate the validity of health claims in packaged food products Increase knowledge and skills to make food choices
4. Food is Personal	Food and mood; recipe: greens with quinoa	Knowledge and reflectiveness	<ul style="list-style-type: none"> Increase awareness of the associations between mood and food behaviors Strengthen self-efficacy for monitoring such behaviors
5. Neighborhood Food Assessment – Part 1	Survey of local stores and markets, school and local food assessment development	Outcome expectations	<ul style="list-style-type: none"> Become more aware of which healthy food items are accessible in their school and neighborhood Develop strategies developed for planning and finding other avenues to healthy food choices
6. Neighborhood Food Assessment – Part 2	Mapping activity: healthy vs nonhealthy neighborhood food sources; presentations	Self-reflections: students realize their local stores are not the only option, but that they may venture out to stores with more healthy options	<ul style="list-style-type: none"> Locate the more healthy choices within their neighborhood and school food using a community map Increase self-efficacy for obtaining healthy food in their school and local community
7. What is Food? Production Effects on Human/Environmental Health	Ecosystem effects; food web evaluation; recipe: broccoli and ginger stir fry	Knowledge and intentionality: being aware of the food products bought, keeping the environment in mind	<ul style="list-style-type: none"> Develop awareness of the environmental costs of factory food production Increase self-efficacy for making food choices that promote environmental and human health
8. Meet the Farmer	Alternative food resources: community supported agriculture, farmers' markets; food co-ops; recipe: veggie wrap	Knowledge, intentionality and skill building, being aware of the food products bought, keeping the environment in mind, learning recipes	<ul style="list-style-type: none"> Increase awareness of regional resources for sustainably produced food Gain knowledge and self-efficacy for changing choices about food

(continued)

Table. Continued

Theme	Key Topics Covered	Component of the Theory the Theme Addresses	Anticipated Outcome-Students will:
9. Food Politics	Food policy; areas for change; recipe: fricassee	Knowledge and skill building	<ul style="list-style-type: none"> Develop knowledge of food policy implications that influence food supply Increase awareness that food choices are linked to political decisions Learn fundamentals of growing food Increase awareness of food production Increase self-efficacy for self-production of food as alternative to commercially produced food choices
10. Seed Germination	Garden visit; planting seedlings; climate considerations	Knowledge	<ul style="list-style-type: none"> Develop understanding of the full cycle of food, from production, to consumption, to waste disposal/recycling and decomposition Increase awareness about making ecological food choices Increase skills for making food choices that are consonant with the individual's personal values
11. Compost	What is compost? Make a compost bin; dig for worms and garden exploration	Self-reflection: students motivated to become an active part of supporting a healthy ecosystem	<ul style="list-style-type: none"> Explore how to grow a wide variety of herbs Develop ability to add flavor in a healthful way Increase self-efficacy related to using herbs and seasonings to reduce reliance on salt for flavoring Enhance gardening skills and self-efficacy by raising along the full cycle of the food system similar to #11 above Develop skill to successfully raise food crops Enhance self-efficacy for choosing to grow food outside of school environment, even a simple window box of herbs Develop gardening skills by completing the growing cycle for garden-fresh snacking options Increase self-efficacy for more creation of snacks from scratch over processed food
12. Soil Study – Garden Planning	Analyze soil samples; vegetable origins; herb tasting with potatoes; selection for garden	Skill building	
13. Planting and Plant Life Cycle	Planting; insects: beneficials vs pests; perennials vs annuals	Skill building	
14. Plant Growth Comparisons	Garden stewarding; student video production	Skill building	
15. Garden-Fresh Snacking	Early harvest garden recipes: edible flower; nut butter and herb crunch	Skill building	

Table. Continued

Theme	Key Topics Covered	Component of the Theory the Theme Addresses	Anticipated Outcome-Students will:
16. Garden Celebration Planning	Plan menu; design garden as event venue; assign responsibilities	Skill building: students plan and make goals for the year-end celebration applying what they have learned	<ul style="list-style-type: none"> Develop skills for planning a celebration that involves cooking own food rather than relying on store-bought food Enhance self-efficacy for social enjoyment of healthful, self-prepared food Increase self-esteem/pride by preparing food for others in a celebratory fashion Develop self-efficacy for sharing healthful food with others
17. Garden Celebration	Semester culmination and presentations, student-prepared lunch in garden	Self-reflection: students reflect on what they have learned and how it will affect future decisions	

students' proficiency in using a knife for chopping, following recipe directions, and so on. Qualitative measures included focus group data, journal entries, and writing activities about eating, cooking, and beliefs about food.

Program Adoption was assessed by monitoring the number of teaching staff from each school who received 2 days of program training (focused on skills needed to teach the program's comprehensive lesson plans) and the number of teachers who actually taught the lessons. Program Implementation was measured by teachers' completion of a weekly online lesson feedback survey to gather information on lesson feasibility and fidelity. This feedback included suggestions to enhance student engagement, improve handouts, and better accommodate the daily 1-hour class lessons.

Program Maintenance was addressed by creating an ongoing mechanism for teacher training, as teacher attrition presents a problem for program sustainability in most inner-city schools. Additionally, the authors developed relationships with school foodservice personnel to increase the potential for maintaining positive changes, as participating students were invited to join a school foodservice nutrition advisory committee.

STUDY FINDINGS

The study sample included the entire ninth-grade class (n = 98) at a Brooklyn, New York, high school where nearly one third of students are from households with annual incomes below the poverty level and the school reports that 99% are from minority groups.¹¹ Using a randomized pretest posttest control-group design, half (n = 49) of the ninth-grade class was randomly assigned to the intervention and the other half (n = 49) to the comparison condition, which consisted of an art class.

Analysis of variance and *t* tests using SPSS (version 14.0, SPSS, Inc., Chicago, IL, 2005) demonstrated improvements in food intake based on the 15 nutrition items selected from the Youth Risk Behavior Survey for this survey. There was an overall increase in score of 4.9 points, or 20.4% ($P < .01$), in the intervention

classes compared with 1.6 points, or 5.7%, in control classes (NS). Improved scores correlated with reporting increases in eating vegetables as snacks ($r = 0.64, P < .001$), preparing healthful snacks for self ($r = 0.48, P < .01$), and having sit-down meals with family ($r = 0.55, P < .004$).

The qualitative data (eg, focus group transcripts and student writing from reflective exercises) were reviewed for common themes. These data suggested that students improved their nutrition knowledge and attitudes about healthful eating. Typical comments included: "I used to think eating healthy was eating a fruit a day and taking your vitamin. Now I see it is more than that. I love to eat fruits and vegetables to keep healthy" and "I used to think I should try new foods; now I do it!" In another development, students became peer educators by conducting cooking demonstrations in school and at community events and farmers' markets.

The Diet for a Healthy Planet with Teen Battle Chefs curriculum has been further integrated into the school's curriculum offerings as 1 of several electives. It is offered in 2-hour blocks with smaller class sizes (up to 12 students) each semester for students in grades 9-12 in over 85 schools in 16 states. Depending on school preference, it can be conducted in school or after school. This structure is enhanced through peer learning, in which students with prior experience in the class assist students who are new to culinary arts and nutrition. The schools also institute foodservice changes to provide more healthful menu choices.

CONCLUSIONS

Participants in Diet for a Healthy Planet with Teen Battle Chefs reported behavioral changes and greater awareness of opportunities for and interest in healthful eating at home and at school. These changes and the peer learning suggest the value of students sharing and using knowledge developed in the course. Such lessons learned can be applied to other high school settings to encourage a combination of skill building in cooking and gardening, experiential learning, and self-reflective techniques to improve dietary behavior and attitudes. The

school foodservice linkage resulted in improving both the ratio of fresh fruits and vegetables offered and student participation in the school's lunch service.

NOTES

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