
PRACTICE PROJECTS

Cooking Up Energy

Response to a Youth-Focused Afterschool Cooking and Nutrition Education Program

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Cooking Up Energy, a 10-week cooking and nutrition education program, investigated program influence on body weight status and food-related behaviors in 56 youths. No significant change in body weight status in the group of matched pairs ($N = 46$) or in a subgroup of 22 overweight/obese participants ($t_{22} = 0.1491$; $P > .05$) was found. However, maintenance of weight velocity was achieved. Although no significant changes were found in meal preparation frequency, a trend was noted for increase in preparing breakfast and dinner. Program evaluations were positive, and most youths reported an intention to make healthier food choices following program completion.

Key words: *childhood, cooking program, nutrition education*

SCATTERED reports of reduced prevalence of childhood obesity in certain locations and in specific age categories have been reported recently.^{1,2} However, high incidence rates persist, particularly among minority youth.³⁻⁵ Childhood obesity remains a major public health concern and is poised to confer significant personal detriment and a steep economic cost to society.⁶⁻⁸ Innovative programs that have the potential to impact positively food choice, food-related

behaviors, and body weight status in youths are desired to reduce the prevalence of childhood obesity.⁹

Children model the food behaviors that they observe, although the opportunity to observe meal preparation is diminishing both on the school campus,^{5,10} and in the home kitchen.¹¹ The average American spends only 27 minutes per day engaged in meal preparation, whereas several hours are spent watching television, often while eating.^{11,12} Research supports an association between healthy food choice and involvement in meal preparation by adolescents and young adults,^{13,14} so teaching youths how to participate in meal preparation has the potential to empower them with a lifelong skill that can buffer obesity risk.^{5,9}

Several studies have been conducted to gauge the impact of providing cooking experiences to youths. Davis and colleagues¹⁵ delivered a gardening, cooking, and nutrition education program to Latino schoolchildren during afterschool hours and found a statistically significant reduction in body weight status in a subgroup of overweight and obese

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participants who completed their program when compared with a group of students in a control group. Liquori and colleagues¹⁶ reported an increase in participant food knowledge of children in kindergarten through sixth grade following a 10-week, school-based CookShop program. Quinn and colleagues¹⁷ reported an increase in confidence regarding food preparation and willingness to try new foods following delivery of the same CookShop program to fourth and fifth graders. Strong stakeholder support was found for the school-based Cooking with Kids program,¹⁸ and an increase in interest in cooking by schoolchildren following participation in the program.¹⁹ Cooking Matters, a privately funded program developed for schoolchildren and their families, found improvement in youths' attitudes about eating healthy foods and confidence in discussing healthy eating and cooking with their parents following program completion.²⁰

The purpose of this study was to report on changes in body weight status and self-reported food-related behaviors, including food shopping and meal preparation frequency, in youths 7 to 13 years of age following participation in Cooking Up Energy (CUE). The CUE program is a 10-week cooking and nutrition education program that offers participants experiential learning experiences. It is designed as a multiyear program aiming to target all youths at the Glen Cove Boys and Girls Club 6 to 16 years of age. This report reviews the results from year 1 of the program.

METHODS

Participants

Institutional review board approval was received from Long Island University in New York to conduct this study. Written parental/guardian consent and child assent were obtained from each youth prior to data collection. The principal investigator (PI) partnered with the Glen Cove Boys and Girls Club to conduct the CUE program 1 afternoon a week for 2 cycles of 10 weeks in the fall of 2011 and the spring of 2012, with

youths grouped according to age: 10 to 13 years and 7 to 9 years, respectively. All attendees at the Glen Cove Boys and Girls Club who were 7 to 13 years of age were invited to participate in the program. Flyers inviting club members were posted in English and Spanish on the informational bulletin board at the entrance to the Glen Cove Boys and Girls Club, and all eligible attendees were given a parental/guardian consent form to take home. At the end of the program, all youths were provided with an age-appropriate Healthy Cookbook and a \$10 gift card to a local supermarket.

Program procedures

The youths attended 10 weekly cooking and nutrition education sessions lasting 1 hour that provided hands-on food preparation instruction with individual participation at the Glen Cove Boys and Girls Club. Recipes were designed by the PI and incorporated favorite foods consumed by youths, but with reduced amounts of salt, fat, and sugar and emphasized fruit, vegetables, and whole grains (Table 1). Each of 4 work tables included 6 to 7 youths and 2 university nutrition student volunteers. Volunteers introduced the recipe, described how the recipe was to be prepared, demonstrated culinary techniques, and guided the hands-on process of recipe preparation. All volunteers attended a mandatory, hour-long training session conducted by the PI who reviewed program procedures and safety precautions. When the recipe was complete, all youths and the volunteers tasted the food together. This offered the opportunity for a discussion focused on food, nutrition, and how good healthy food tastes. Volunteers used prearranged, age-appropriate verbal prompts to start the dialogue at the table (Table 1). Youths were provided with a copy of the recipe at the end of the session.

Body weight, height, and body mass index

Body weight and height measurements were taken at baseline and at the end of program. All measurements were taken up to

Table 1. Cooking Up Energy Program Outline

Week	Recipe	Focus	Sample Verbal Prompt
1	Fruit salad with honey yogurt dressing	Increase fruit	How many fruits should you eat each day?
2	Sweet potato fries	Decrease fat and salt	Do you think that these fries are better for you than fast food French fries?
3	Apple crumble muffins (made with whole wheat and oatmeal)	Decrease fat and sugar; increase whole grains	What whole grain ingredients are in this recipe?
4	Chicken tacos (served on a whole grain tortilla)	Decrease fat and salt; increase vegetables and whole grain	What do you think makes this taco healthier than a fast food taco?
5	Salad with beans and homemade low-fat ranch dressing	Decrease fat and salt; increase fiber and vegetables	What other healthy ingredients could you put in your salad?
6	Oatmeal cookies	Decrease fat and sugar; increase whole grain	How do the taste of these cookies compare with store bought cookies?
7	Cool beverages: Fruit Fizzy and yogurt smoothie	Decrease sugar and fat; increase fruit	How many of you would drink the Fruit Fizzy instead of soda?
8	Whole wheat pita pizza	Decrease fat and salt; increase vegetables and whole grain	Why do you think this pizza is healthier than a typical Pizzeria-style pizza?
9	Chicken chili	Decrease fat; increase fiber and vegetables	What ingredients make this recipe healthier than typical chili?
10	Individual low-fat yogurt parfait (topped with whole grain cereal and fresh fruit)	Decrease fat; increase fruit and whole grain	What other fruit or toppings could you use to make this parfait?

1 week before and no later than 1 week following the end of program at the same time of day. Measurements were taken twice at baseline and twice at the end of program, and each time the 2 readings were averaged for the final recorded reading. Weight was measured using the Tanita BF679W Dual Scale with Body Fat Measure with Body Water and measurements were recorded within one-tenth of a pound. Youths were weighed in light clothing and were asked to remove their sneakers, sweater, or sweatshirt. Height was taken using the HealthoMeter Lightweight Wall Mounted Stadiometer Height Rod 24-83 inches. Children were asked to remove shoes and any headbands and stand straight for an accurate reading: measurements were recorded within one-tenth of a centimeter.

Each youth's body mass index (BMI) was calculated using the Centers for Disease Control and Prevention's online calculator that converts date of birth, date of data collection, height, weight, and sex into a BMI percentile.²¹ Body mass index data were categorized according to the Centers for Disease Control and Prevention's guidelines: those with a BMI below the 5th percentile were categorized in the underweight category; those with a BMI between the 5th and 84th percentiles were categorized in the healthy weight category; those with a BMI reading 85th or more percentile and 94th or less percentile were categorized as overweight; and those who had a BMI 95th or more percentile were categorized as obese.²¹

Instruments

The Food Shopping and Meal Preparation Frequency survey was developed by the CUE study investigators on the basis of the current literature investigating food shopping and cooking frequency^{13,19,22-24} and an interest in quantifying time spent in these behaviors for investigative purposes. The survey was pilot tested with a small group of children (7-10 years of age), and minor adjustments were made to the document to enhance understanding and ease of completion. The survey was developed using simple

language and a Likert-type rating response for 11 ordinal items that ask the participant to report how frequently he or she assists an adult with either food shopping or food preparation. Each item has 4 response options ranging from "never" to "5 or more times per week." Younger children and those who had any difficulty with completing the surveys were given one-on-one assistance by a volunteer to complete the survey. The survey was administered to the youths before and after the intervention to determine any self-reported change in frequencies.

The CUE Program Evaluation Survey was developed by study investigators to query youths on their experiences during the program and their perceived change in behaviors following the program. The program evaluation included questions that addressed the acceptability of the program (eg, "Overall I really enjoyed participating in the Cooking Up Energy program"), as well as food-related thought processes (eg, "Since finishing the program I am now more interested in preparing food at home"). Youths responded to the statements using Likert-type response options: (1) greatly agree; (2) agree; (3) disagree; or (4) greatly disagree.

Research design and analysis

This program used a repeated-measures design and collected data at baseline and upon program completion. Only those youths who had both matched pre- and post-intervention data were included in the analyses. The STATA program (version 13; 2013) was used to obtain descriptive statistics and conduct paired *t* tests, sign test, and Wilcoxon sign test.

RESULTS

Participants

Data were collected in the fall of 2011 through the spring of 2012 and analyzed in 2013. Sixty youths enrolled in the CUE program, with 36 and 24 youths in the fall of 2011 and spring of 2012, respectively. Three youths in the fall and 1 in the spring session dropped out of the program after completing

child assent, but before the third session. In total, 56 youths participated in the program; however, matched pre- and postprogram data were available for 46 youths. The majority of participants were Hispanic (52%) and male (59%). See Table 2 for baseline participant characteristics.

Weight

Forty-eight percent of the participants were overweight or obese at baseline, and this percentage was slightly reduced by the end of program (46%). Baseline data of 46 participants revealed 24 at healthy weight, 8 as overweight, and 14 as obese. At the end of the program, 25 participants were at healthy weight, 7 as overweight, and 14 as obese. While there was movement between categories, this change was not statistically significant (Table 3), nor was there a statistically significant change in BMI percentile found in the 22 youths in the subgroup of overweight and obese ($t_{22} = 0.1491$; $P > .05$).

Food shopping and meal preparation frequency

There were no statistically significant changes found in either shopping or food

preparation frequencies from baseline to the end of treatment. However, there was an increase in frequency when participants reported assisting with the preparation of breakfast and dinner at the end of program compared with baseline. Although statistical significance is lacking, the trend toward an increase in the frequency of participation in preparing these meals is noted (see the Figure).

Program evaluation

Overall, the results of the program evaluation were very positive, with the large majority of youths agreeing that they enjoyed participating in the CUE program, enjoyed the hands-on food preparation tasks, and would recommend the program to a friend. Improvements in intention to change behaviors were reported as well (Table 3).

DISCUSSION

This project aimed to investigate outcomes following participation in the CUE program on body weight status and food-related behaviors in youths 7 to 13 years of age. Comparing pre- and postprogram data revealed that there were no statistically significant changes found in the mean BMI categories for all youths, as well as no reduction in BMI percentile readings in a subgroup of overweight and obese youths. Resistance to reducing body weight in overweight and obese participants following childhood obesity interventions has been commonly reported.²⁵ In addition, no significant change in mean BMI percentile, also viewed as weight velocity maintenance, or slow gain over a 3-month span of time in overweight and obese youths with several factors of increased risk for weight gain can be viewed as a beneficial short-term outcome.^{26,27} Furthermore, researchers recently reported finding improvement in several outcomes, such as cardiovascular fitness and self-esteem as well as reduced sedentary behavior following an intervention that targeted childhood obesity despite lack of weight loss at the end of the program.

Table 2. Baseline Participant Characteristics

Study Population Characteristic	Result (N = 46)	Range
Sex		
Female	19 (41%)	...
Male	27 (59%)	...
Ethnicity		
Hispanic	24 (52%)	...
Black	16 (34%)	...
White	3 (7%)	...
Other	3 (7%)	...
Mean (SD)		
Age, y	9.8 (1.62)	7-13
Body weight, lb	94.5 (34.6)	45.4-206.3
Body mass index, kg/m ²	21.0 (5.2)	14.6-38.8
Body mass index percentile	74.7 (25.3)	6-99

Table 3. Response to Program Evaluation Statements (n = 47)

Comment	% Greatly Agree (n)	% Agree (n)	% Disagree (n)	% Greatly Disagree (n)
I really enjoyed participating in the CUE program	51 (24)	36.2 (17)	8.5 (4)	4.3 (2)
I had a lot of fun cooking with my friends	59.6 (28)	29.8 (14)	6.4 (3)	4.3 (2)
I liked preparing food	51.1 (24)	42.6 (20)	4.3 (2)	2.1 (1)
Overall the taste of food is very important to me	63.8 (30)	31.9 (15)	0 (0)	4.3 (2)
It's possible to make healthy food taste good	48.9 (23)	40.4 (19)	4.3 (2)	6.4 (3)
I liked learning nutrition facts about food	53.2 (25)	34 (16)	6.4 (3)	6.4 (3)
I learned that healthy food can taste good	53.2 (25)	31.9 (15)	10.6 (5)	4.3 (2)
I'm now more interested in preparing food at home	48.9 (23)	36.2 (17)	10.6 (5)	4.3 (2)
I now feel that I will make healthier food choices	44.7 (21)	46.8 (22)	4.3 (2)	4.3 (2)
I would recommend the CUE program to a friend	48.9 (23)	38.3 (18)	4.3 (2)	8.5 (4)

Abbreviation: CUE, Cooking Up Energy.

Researchers have highlighted program impact in the absence of significant change in body weight.²⁸ In contrast to our findings, Davis and colleagues¹⁵ were able to find statistically significant reductions in BMI readings and reduced weight gain in their intervention group attendees in the overweight and obese categories following a 12-week gardening, cooking, and nutrition education program. Of note, however, is that Davis and colleagues compared changes in their intervention group with a separate control group, whereas CUE investigators compared pre- to post-intervention changes within the same group.

There were no statistically significant differences found in food shopping and meal preparation frequency in participants between baseline and completion of program. However, a trend toward an increase in reported frequency in preparing both breakfast and dinner is encouraging (see the Figure). Our program may not have been long enough to have a greater impact on meal preparation

behaviors at home, or there may be other obstacles that interfere with youths' participation in food shopping and meal preparation at home.^{13,19,29,30} Investigating ways to link learning between the afterschool program and the home environment may lay the path toward greater program impact.^{19,29}

Unlike Liquori and colleagues¹⁶ yet similar to the Cooking Matters program,²⁰ we found that participation in CUE had a positive impression on youths' perception of anticipated behaviors in terms of increased interest in preparing food and greater likelihood to make healthier food choices. Similar to several cooking and nutrition education programs around the country,^{16,18,19,31} we found that the majority of youths enjoyed the experiences and would recommend the program to a friend.

There are several limitations to consider regarding the CUE study. Our data reflect outcome measurements on 46 participants, with 87% of youths representing 2 minority groups from 1 community on Long Island in the state

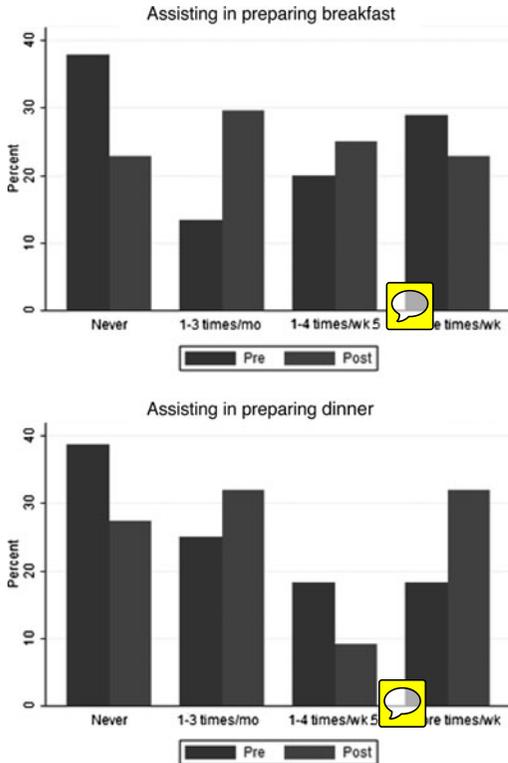


Figure. Pre- and postprogram results for youth involvement in preparation of breakfast and dinner (N = 46).

of New York. Therefore, our findings cannot be extrapolated to other groups or communities. In addition, youths were recruited from a convenience sample and lacked a control group. The surveys were self-reported, and although we had volunteers assist the youths while completing the forms, the possibility of misunderstanding the questions still exists. In addition, the Food Shopping and Meal Preparation Frequency survey was not tested for validity or reliability, therefore limiting the

findings. Study strengths include the use of an intervention that allowed youths to actively participate in learning and incorporated nutrition messages that were embedded in tableside conversations. In addition, objective measurements for body weight status determination were collected on-site by investigators.

CONCLUSION

The results from year 1 of the CUE program add data to a limited body of work reporting outcomes following youth participation in cooking and nutrition education programs. The CUE program is one of several cooking programs that collected on-site weight and height data to assess change in body weight status.⁹ Lack of statistically significant changes in outcomes in year 1 may be due to the short program duration, the small participant number, or unknown obstacles in extending the program messages to the home environment. As the CUE program continues into subsequent years, modifications will be made to program design as well as establishing validation and reliability of the survey instruments to better capture short-term outcomes.

Youths make better food choices when involved in meal preparation and would benefit from learning how to cook, but opportunities to learn this life skill are diminishing.^{9,10,13,32} More research is needed to investigate both short- and long-term outcomes following youth-focused cooking and nutrition education programs.^{25,28} Modifications to program design and the identification of program components that result in greater impact in promoting healthy behaviors are also needed.

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