

Outcome Evaluation of the Super Star Chef Summer Youth Nutrition Education Program

Abstract

Super Star Chef is an experiential summer youth nutrition education and cooking program designed to enhance participants' nutrition knowledge, food preparation skills, cooking self-efficacy, and intention to eat more fruits and vegetables. In a program evaluation comprising a single-sample pretest-posttest design, participants' pretest and posttest scores on variables of interest were compared. Gender and grade level differences in outcomes also were examined via analysis of variance tests. Results showed statistically significant preprogram-to-postprogram gains in participants' nutrition knowledge, food preparation skills, and cooking self-efficacy and a grade level difference in food preparation skill outcomes. Study limitations and implications for further research are discussed.

Keywords: [nutrition education](#), [youth cooking program](#), [cooking self-efficacy](#), [nutrition knowledge](#), [Supplemental Nutrition Assistance Program Education](#)

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Introduction

Research and evaluation studies have documented the positive impacts of nutrition education and cooking programs on children's food choices, food preparation skills, cooking knowledge, desire to help prepare food at home, cooking confidence, cooking self-efficacy, and attitudes toward cooking (Caraher, Seely, Wu, & Lloyd, 2013; Chen et al., 2014; Cunningham-Sabo & Lohse, 2013, 2014; Harmon, Smith, Pirkey, Beets, & Blake, 2015; Lockhart, 2014). With specific regard to the impact of nutrition education and cooking classes on children's food choices, Anderson et al. (2005) found positive associations between participation in cooking programs and children's willingness to taste and consume fruits and vegetables. Similarly, Cunningham-Sabo and Lohse (2013, 2014) reported increased fruit and vegetable preferences following

cooking and tasting classes with elementary school children. Research also has suggested that children consume significantly ($p < .05$) more fruit and vegetable servings following participation in food preparation classes (Brown & Hermann, 2005; Caraher et al., 2013; Van der Horst, Ferrage, & Rytz, 2014).

The advantages of nutrition education and cooking classes for school-aged children cannot be overemphasized. In their review of eight research studies of the impact of cooking classes on school-aged children, Hersch, Perdue, Ambroz, and Boucher (2014) concluded that cooking education programs may be a promising tool for enhancing positive changes in children's food-related behaviors, preferences, and attitudes. Youth nutrition education and cooking programs often provide participants, especially those from socioeconomically disadvantaged backgrounds, with cooking and food preparation learning opportunities that otherwise may be unavailable to them. Although research has shown that assisting with food preparation at home increases children's fruit and vegetable consumption (Chen et al., 2014; Chu, Storey, & Veugelers, 2014; Harmon et al., 2015), there has been a societal decline in culinary skills due to changes in family structures, workforce participation, and values (Nelson, Corbin, & Nickols-Richardson, 2013; Thomas & Irwin, 2011). As a result of the declining culture of cooking at home, fewer children are learning about cooking from parents. Nutrition education and cooking programs fill this gap by engaging children in experiential and hands-on activities through which they can learn and practice food preparation skills.

The evaluation study reported in this article examined the impact of Super Star Chef, a youth summer nutrition education and cooking program, on participants' nutrition knowledge, food preparation skills, cooking self-efficacy, and intention to eat more fruits and vegetables.

Program Overview

Super Star Chef is a summer youth nutrition education and cooking program developed by University of Kentucky Extension personnel with expertise in nutrition education and dietetics. Super Star Chef is intended to enhance participants' nutrition knowledge, food preparation skills, and cooking self-efficacy and improve the likelihood that they will consume more fruits and vegetables. The target audience is students entering third grade through sixth grade. The program has been implemented in multiple counties in Kentucky and takes place in county Extension offices or other convenient locations with kitchen facilities (e.g., churches). The 3-day program involves about 12 hr of instruction. The curriculum is taught by teams of undergraduate and graduate students studying nutrition, dietetics, or related fields at three local universities. A pilot version of the curriculum was internally reviewed for face validity and appropriateness of content for the audience.

Super Star Chef program components include a 25-hr instructor training, curriculum implementation, and cooking demonstrations and other wraparound activities (Table 1).

Table 1.
Super Star Chef Program Components

Program element	Description
Instructor training	Twenty-five hr of instructor training to <ul style="list-style-type: none"> familiarize instructors with the Super Star Chef curriculum;

	<ul style="list-style-type: none"> • teach instructors the cooking skills and tools required for implementing the program; • provide opportunities for instructors to practice all recipes and lessons; and • train instructors in other relevant topics, including first aid, youth development principles, classroom management and organization, and strategies for handling student misbehavior.
Program curriculum	<p>The curriculum involves hands-on learning experiences that teach</p> <ul style="list-style-type: none"> • nutrition concepts (e.g., MyPlate and using nutrition facts labels); • food preparation and cooking skills (e.g., reading and following of recipes; measuring techniques and measuring equivalents; use of oven and stovetop and appropriate cooking temperatures; kneading of dough, preparation of batters, and other baking skills; knife skills); and • food safety—specifically, the concepts of clean, separate, cook, and chill based on the U.S. Department of Agriculture's Fight BAC (2007) guidance.
Cooking demonstrations and other wraparound activities	<p>Other program activities include</p> <ul style="list-style-type: none"> • daily cooking demonstrations and recipe preparations (participants prepare multiple recipes, including mixed berry parfait, fresh tomato salsa, calzones, and carrot muffins); • daily physical activities and games; and • provision of reinforcement items such as recipes, food safety information, aprons, and simple cooking tools.

Methods

Super Star Chef program evaluation involves a single-sample pretest–posttest design. Program outcomes are evaluated via multisection pretest and posttest instruments administered before and after program participation to assess participants' nutrition knowledge, food preparation skills, and cooking self-efficacy and their self-reported learning gains. In 2018, we conducted a study to evaluate the program. The University of Kentucky Institutional Review Board approved the study protocol.

Participant Description

Participation in Super Star Chef is open to students 9–18 years of age. However, the curriculum and the program evaluation instrument primarily target students entering third grade through sixth grade (referred to herein as third-grade through sixth-grade students). In 2018, Super Star Chef was implemented in 45 Kentucky counties, with 495 third-grade through sixth-grade students completing the pretest and posttest.

Of the 495 participants, 23% were male and 77% were female. Also, 26% were third-grade students, 27% were fourth-grade students, 28% were fifth-grade students, and 19% were sixth-grade students.

Program Outcomes and Measurement

All participants in the evaluation study completed the pretest before participation in the program and the posttest after participation in the program. In 2017, Super Star Chef program evaluators and content specialists reviewed a pilot version of the pretest and posttest assessment instruments for content validity and alignment with learning outcomes. The evaluation team also assessed the instructional sensitivity of the pilot implementation using the pre-post difference index method to identify items with problematic sensitivity values (see Adedokun, 2018, for more on assessment of instructional sensitivity). Guided by the findings of the sensitivity analysis, the team removed nonsensitive items from the pretest and posttest instruments.

The final versions of the pretest and posttest included 14 questions assessing participants' nutrition knowledge and food preparation skills. We coded participants' responses to these questions as 1 (correct) or 0 (incorrect). We measured participants' nutrition knowledge as the total number of correct responses to the six questions assessing their knowledge of MyPlate and their ability to use nutrition label information to select healthful beverages. Similarly, we measured participants' food preparation skills as the total number of correct responses to the eight questions regarding knife skills, safe food handling practices, and doubling of recipes and ingredient measurement.

The pretest and posttest also included Woodruff and Kirby's adaptation of the Cooking with Kids self-efficacy scale (Cunningham-Sabo & Lohse, 2013). Participants were asked to rate their feelings about certain skills identified in seven items (e.g., "Make a meal with fruit," "Measure ingredients," "Cut up food using a knife"), with response categories ranging from 1 (*very hard*) to 4 (*very easy*). We measured participants' cooking self-efficacy by summing their responses to the seven scaled items.

In addition to questions regarding nutrition knowledge, food preparation skills, and cooking self-efficacy, the posttest also included one question regarding participants' intention to eat more fruits and vegetables after participating in the program and seven questions allowing for participants' self-assessment of their learning gains. For these questions, participants indicated the extent to which they agreed or disagreed that they intended to eat more fruits and vegetables or had learned the concept described in a statement (e.g., "I learned how to wash my hands to remove germs"). Response categories for the items ranged from 1 (*strongly disagree*) to 4 (*strongly agree*). For ease of interpretation, we recoded *strongly agree* and *agree* into a single category and combined *strongly disagree* and *disagree* into another category.

Analyses

We conducted paired-samples *t*-tests to examine preprogram-to-postprogram (also referred to hereafter as "pre-post") changes in nutrition knowledge, food preparation skills, and cooking self-efficacy, setting statistical significance at $p < .05$. Moreover, we calculated Cohen's *d* effect sizes to examine the practical significance of pre-post changes in outcomes. Cohen (1977) described *d* values less than 0.2 as small, values of 0.5 as medium, and values greater than 0.8 as large effect sizes. To examine gender and grade level differences in program outcomes, we conducted one-way analysis of variance tests, with statistical

significance at $p < .05$. Finally, we used descriptive statistics to summarize participants' self-assessment of learning gains.

Results and Discussion

Results of the paired-samples t -tests showed statistically significant pre-post increases in participants' nutrition knowledge, food preparation skills, and cooking self-efficacy, with effect size values of 0.25, 2.08, and 0.89, respectively (Table 2). The effect size for pre-post changes in nutrition knowledge is quite low ($d = 0.25$), indicating that the effect may not be practically significant.

Table 2.

Program Impact on Nutrition Knowledge, Food Preparation Skills, and Cooking Self-Efficacy

Program outcome	Pretest <i>M</i> (<i>SD</i>)	Posttest <i>M</i> (<i>SD</i>)	Gain <i>M</i> (<i>SD</i>)	<i>t</i>	<i>d</i>
Nutrition knowledge	5.45 (0.93)	5.68 (0.64)	0.23 (0.94)	5.56***	0.25
Food preparation skills	5.03 (1.19)	7.35 (0.92)	2.33 (1.11)	46.46***	2.08
Cooking self-efficacy	25.43 (4.12)	29.50 (3.46)	4.07 (4.20)	21.21***	0.89

*** $p < .001$.

After participating in the program, approximately 93% of the participants reported that they intended to eat more fruits and vegetables (Table 3). Participants' responses to the self-assessment of learning gains items also indicated positive program impact (Table 3). Over 96% of the participants agreed/strongly agreed with all of the stated learning gains.

Table 3.

Participants' Self-Assessment of Intention and Learning Gains

Item	No. of respondents	Strongly agree/agree		Strongly disagree/disagree	
		<i>f</i>	%	<i>f</i>	%
After participating in the program, I intend to eat more fruits and vegetables.	489	453	92.64	36	7.36
I learned how to wash my hands to remove germs.	489	480	98.16	9	1.84
I learned about the amount of fruits and vegetables I should have on my plate.	488	478	97.95	10	2.50
I learned the correct way to hold a knife for cutting.	487	481	98.77	6	1.23
I learned how to measure ingredients.	488	471	96.52	17	3.48
I learned how to read recipes.	486	467	96.09	19	3.91
I learned how germs can be transferred to food.	489	480	98.16	9	1.84
I learned how to read nutrition labels.	485	470	96.91	15	3.09

Results of the analysis of variance tests did not yield any statistically significant gender differences in program outcomes (Table 4). However, the results showed grade level differences in pre-post gains in food preparation skills, $F(3, 491) = 4.41, p < .05$. We conducted post hoc comparisons using Dunnett's T3 test to identify the specific group difference in food preparation skills among the four grade levels (i.e., third, fourth, fifth, sixth). The results indicated that the statistically significant difference was between sixth-grade and fourth-grade participants. Sixth-grade participants reported statistically significant lower gain scores than fourth-grade participants. There were no other statistically significant group differences in program outcomes.

Table 4.
Analysis of Variance Tests of Gain Scores by Gender and Grade Levels

Outcome	Group	No.	Pre-post gain score (SD)	SS		MS		F (df)
				BG	WG	BG	WG	
Nutrition knowledge	Male	113	0.30 (0.88)	0.65	434.17	0.65	0.88	$F(1, 493) = 0.74$
	Female	382	0.22 (0.95)					
	Third grade	127	0.35 (1.12)					
	Fourth grade	134	0.33 (1.02)	6.72	428.09	2.24	0.87	$F(3, 491) = 2.57$
	Fifth grade	141	0.15 (0.78)					
	Sixth grade	93	0.06 (0.69)					
Food preparation skills	Male	113	2.27 (1.26)	0.38	612.26	0.38	1.24	$F(1, 493) = 0.31$
	Female	382	2.34 (1.07)					
	Third grade	127	2.35 (1.12)					
	Fourth grade	134	2.57 (1.21)					
	Fifth grade	141	2.25 (1.08)	16.08	596.55	5.36	1.22	$F(3, 491) = 4.41^*$
	Sixth grade	93	2.05 (0.93)					
Cooking self-efficacy	Male	105	4.49 (5.38)	22.90	8483.54	22.90	17.61	$F(1, 476) = 1.30$
	Female	373	3.96 (3.78)					
	Third grade	122	4.09 (5.11)					
	Fourth grade	127	4.45 (4.29)	50.44	8355.00	16.81	17.63	$F(3, 474) = 0.95$
	Fifth grade	136	4.11 (3.21)					
	Sixth grade	93	3.48 (4.01)					

Note. No. = number of respondents to item. SS = sum of squares. MS = mean sum of squares. BG = between groups. WG = within groups.
* $p < .05$.

Conclusions

In the evaluation study reported in this article, we investigated the impact of Super Star Chef, a summer nutrition education and cooking program, on participants' outcomes. We also examined gender and grade level differences in program impact. Overall, we found that Super Star Chef positively affects participants' nutrition knowledge, food preparation skills, and cooking self-efficacy; however, the effect size for the impact on nutrition knowledge was of little practical significance. Also, participants reported that the program enhanced their intentions to eat more fruits and vegetables. With regard to possible gender differences in program outcomes, we found that Super Star Chef has comparable impact on the nutrition knowledge, food preparation skills, and cooking self-efficacy of male and female participants. However, although the results indicate comparable preprogram-to-postprogram improvements in nutrition knowledge and cooking self-efficacy across grade levels (i.e., third-grade to sixth-grade), we found that sixth-grade participants showed lower gains in food preparation skills than fourth-grade participants. We believe this difference is most likely due to sixth-grade participants entering the program with higher scores (sixth-grade participants reported the highest level of preparticipation food preparation skill), thereby having limited room for improvement. It is also logical to assume that sixth-grade participants are probably more familiar with cooking than fourth-grade participants.

Implications for Further Research and Practice

American adults and children are starving for more knowledge concerning nutrition and cooking (Condrasky & Hegler, 2010). Cooperative Extension, through the family and consumer sciences and 4-H program areas, is at the forefront of efforts to promote cooking skills and healthful food selection (especially fruits and vegetables) among children. The findings reported in this article support previous evaluation studies (Allirot, da Quinta, Chokupermal, & Urdaneta, 2016; Cunningham-Sabo & Lohse, 2014; Hersch et al., 2014) that have shown positive effects of nutrition education and cooking programs on youth nutrition knowledge, preference for fruits and vegetables, willingness to taste fruits and vegetables, cooking skills, and cooking self-efficacy—outcomes that all are predictive of healthful nutrition choices (Chen et al., 2014; Nelson et al., 2013).

Although our findings suggest that Super Star Chef is effective for improving the nutrition knowledge and food preparation skills of both male and female participants, they also indicate a need for program differentiation by grade level. The sixth-grade participants in our study appeared to have entered the program with greater food preparation skills. We suspect that food preparation skills taught in the program could have been too elementary for the sixth graders, who may need education on more advanced or higher level skills. Extension programmers promoting cooking skills and nutrition among children should consider incorporating differentiated elements or components to meet the needs of participants in various age and/or grade groups. For example, fourth-grade cooking instruction may emphasize simple knife skills (e.g., how to hold a chef knife properly and how to slice fruits) whereas sixth-grade instruction may emphasize advanced skills such as chopping onions and cutting more challenging foods (e.g., meats).

We are currently using the findings of our study to improve the Super Star Chef curriculum and its implementation, after which the curriculum will be made available for use by other Extension personnel within and outside the University of Kentucky. For example, although the data we have reported came from classes taught by teams of graduate and undergraduate students, we have and will continue to explore the

potential of having family and consumer sciences and 4-H agents teach the classes. Agent-led implementation of the Super Star Chef program would provide a more cost-effective model, which may make the program more appealing for other Extension systems to adopt. Future evaluations of the curriculum could compare participant outcomes and program fidelity between classes taught by student teams and classes taught by agents.

Those in Extension developing similar youth nutrition education and cooking programs can use our findings to inform their curricula (e.g., focus cooking skill instruction more specifically by grade level). There is also the opportunity to replicate and confirm the findings of increased nutrition knowledge, food preparation skills, and cooking self-efficacy. Evaluation of programs can extend our cumulative knowledge in Extension of best practices for encouraging a more healthful diet among youths.

The evaluation study reported in this article is not without limitations. For example, we did not include analyses of fidelity of implementation across the multiple sites or the extent to which instructors' fidelity to or deviation from program implementation guidelines may have influenced participant outcomes. Also, our study did not include longitudinal or follow-up data for examining whether the reported gains persisted beyond participation in the program. Future evaluation of Super Star Chef and similar programs may address long-term behavior change outcomes. For example, did participants' intention to eat more fruits and vegetables become an eventual behavior change (i.e., did participants end up consuming more fruits and vegetables)? Future studies could also include experimental comparisons of program outcomes between participants and nonparticipants.

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