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CASE REPORTS

Kids Cooking Schools: A Case Report of How Culinary Education Promotes Nutrition and Knowledge among Children in a Midwestern (U.S.) State

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ABSTRACT

Reaching children with nutrition and health programming is a timely issue now and will continue in the future. Childhood obesity has more than tripled in the U.S. in the last several decades. According to the World Health Organization (2021), 340 million children and adolescents aged 5 to 19 were overweight or obese as of 2016. Obese children are at higher risk for cardiovascular disease, with 70% showing at least one risk factor for cardiovascular disease. Obesity also increases the risk for diabetes, stroke, cancer, and osteoarthritis.

Meals eaten as a family at home can save money and tend to include less fat, less soda pop, and more fruits and vegetables. These "family meals" tend to be higher in calcium, fiber, and other essential nutrients. The "On the Move to Better Health Kids Cooking School" and the "Kids Baking School" curricula, both developed at a Midwestern U.S. Land Grant University, moved forward in new ways during the pandemic and have reached more than 1,600 children face-to-face and virtually, including 400 during the pandemic. The programs used a variety of new approaches to involve not only children, but also their families at home and our community partners. Children showed increased nutrition and food safety knowledge. The children reported increased consumption of fruits, vegetables and whole grains, and increased confidence in using kitchen tools. Parents reported increased fruit and vegetable consumption among their children and reported their children were more confident in food preparation at home.

Introduction

One in five children in the U.S. is overweight or obese.¹ Globally, obesity among children and adults is an ongoing topic of health concern, because obesity is linked to greater risk of heart disease, cancer, diabetes, breathing issues, osteoarthritis, and many other health concerns.^{1,2} Childhood obesity has more than tripled in the U.S. in the several decades. Environment and other factors (school, childcare, neighborhood design, access to healthful food, and safe places for physical activity) play various roles in the risk for overweight. Research has shown that culinary education (“cooking schools”), gardening programs and farmers markets can improve children’s knowledge, self-efficacy, attitudes and dietary choices.³ In addition, many studies have shown a protective effect of family mealtimes associated with youth obesity. In a 10-year longitudinal study, researchers reported a protective effect of family meals against the presence of obesity among adolescents, especially among young black adults.⁴ More research is needed in this area.

The present project was conducted within a Cooperative Extension System in a Midwestern state. In the U.S., all 50 states (divided into many counties/sections per state) have one or more Land Grant Universities with Cooperative Extension agencies.⁵ The three pillars of a Land Grant University are teaching, research, and extension (outreach). Nutrition education for all ages for the public is among the goals of Cooperative Extension. The Morrill Act of 1862 established a university in agriculture, mechanic arts, and classics in each state, while the Smith-Lever Act of 1914 established the Cooperative Extension system, with outreach of staff particularly to rural areas. Later, in 1890, Land Grant Universities and Cooperative Extension were established in historically black universities. In 1994, Cooperative Extension was established in tribal areas to reach Native American/American Indian audiences. Therefore, for more than 100 years, county-based educators have worked with local citizens and interest groups to solve community problems, evaluate the effectiveness of learning tools, and collect grassroots input to prioritize future research.⁵

The current nutrition recommendations for children and adults in the U.S. are based on the Dietary Guidelines for Americans 2020-2025⁷ and its icon with an accompanying website, MyPlate.⁸ U.S. children and adults are particularly short in their consumption of fruits, vegetables, and whole grains. In general, elementary-age children need 2.5 cups of vegetables, especially dark green, orange and

gold, and 2 cups of fruit, especially whole fruit, to meet current recommendations. Fruits and vegetables should comprise one-half of a plate at most meals.⁸

Income level can influence fruit and vegetable consumption. Lower-income households have been shown to consume fewer fruits and vegetables than their counterparts with higher incomes. Further, lower-income U.S. families may prefer foods such as sweet bakery products instead of fruits, vegetables and dairy.⁹

Efforts to increase fruit, vegetable, and whole grain consumption are common among nutrition researchers and educators. Involving children in meal preparation can influence food intake, especially vegetables.¹⁰ The researchers noted that the 47 children in the study (51% girls) particularly increased their intake of salad, calories and chicken. The involvement of children in meal preparation can be a strategy to improve children’s overall dietary quality.¹⁰

Other researchers have implemented nutrition and experiential food preparation lessons in school classrooms.^{11,12} They reported significant improvements in knowledge. However, females were found to participate more often than males in some of the studies. Children may be more willing to try new foods if they help prepare the foods or grow the vegetables.¹³ Even a one-time session of meal preparation can influence future food intake.¹⁰

During the global pandemic, health policies led to school closures, disrupted routines and increased stress. With these changes, less opportunity for physical activity and proper nutrition became issues. Among 432,000 people in the U.S. ages 2 to 19, the rate of body mass index (BMI) doubled during the pandemic according to a published study.⁶

Objectives

The objectives of this program were to 1) increase knowledge of nutrition recommendations through hands-on education in school classrooms and community settings, 2) improve nutrition behavior as measured by surveys of children and parents/guardians, and 3) improve food preparation skills through hands-on learning as measured by surveys of children and parents/guardians.

Methods

The target audience for this nutrition and culinary education program consisted of elementary-school

children ages 8 to 12. The educational program occurred during summer months when school was in recess, online during the pandemic when schools did not meet in person, and as afterschool programs that are implemented all year while schools are in session. When in-person classes were held during the early stages of the pandemic, COVID-19 protections were in place, including gloves, masks, and social distancing. The program materials included educational posters and education during face-to-face classes about reducing risk of COVID-19.

The overall program was first pilot-tested as a 4-day “cooking camp” on an American Indian Reservation site.¹⁴ In the pilot study, the 47 children prepared 2 snacks and 1 meal as a way to increase their knowledge and skills during the short-term intervention. After the pilot testing with children, the curriculum was finalized to create an inclusive program for children of all racial and ethnic backgrounds. Newsletters were added for parents, and an online approach to the cooking school, delivered “live” by a remote instructor, was developed with videos, visuals, and online games during early 2020. The curriculum provided current nutrition information and skill-building, hands-on culinary activities and food science activities. The partners for this program included Extension field staff located in counties, and community-based public health partners. The instructors delivered the program in at least 30 community locations throughout the state.

Project partners used scripted curricula that included eight lesson plans for the Kids Cooking School. The nutritional content was based on the concepts from the current Dietary Guidelines for Americans, using the icon of the Dietary Guidelines, ChooseMyPlate. The second curriculum, the Kids Baking School, included five lessons and featured whole grains as well as overall MyPlate/Dietary Guidelines for Americans concepts. The two curricula were taught separately, and children often enrolled in the second curriculum after participating in the first one. Both curricula were developed by nutrition and health specialists at the Land Grant University and had statewide outreach. The project lead (and author of this paper) provided training to all participating Extension staff/instructors through an online platform, visual aids, and ongoing support through email and phone calls.

The two curricula include 1) scripted lessons, 2) visual aids, including food safety and COVID-19 posters based on Food and Drug Administration

and Centers for Disease Control and Prevention guidance, 3) workbooks and worksheets, 4) recipe handouts with picture-based guides, 5) cookbooks with the recipes used in the classes, 6) evaluation surveys for children and parents, 7) take-home newsletters for parents, and 8) a certificate of completion for each student. The curriculum provided flexibility to allow for implementation in various venues and time frames. Before beginning any instructions, the children completed a pre-test based on the course content. Each class lasted at least two hours, with take-home materials to continue their exploration of the course content. The children took part in a lecture/discussion time followed by hands-on cooking, taste-testing and review games. Upon completion, the children each received an incentive: a “cooking kit” with measuring tools (cups, spoons), oven mitt, cutting board, can opener and several other items all packed in a reusable lunch box. The programs were delivered face-to-face, or online using Facebook Live, Zoom or Google classrooms – using a combination of approaches depending on the phase of the pandemic.

The lessons were delivered daily or weekly for two to three hours per session depending on the location. Each child participated in 10 to 15 hours of instruction, plus the children were provided with at-home activities to try with their families. The topics included 1) introduction to MyPlate, 2) food and culture, 3) reading Nutrition Facts labels on food products to choose more healthful products, 4) identifying and using cooking equipment, 5) measuring ingredients, 6) gardening activities (in some cases) and 7) basic food preservation techniques such as freezing and drying. The children worked in teams and prepared one to three recipes per session, followed by taste testing and review games. They learned cooperation as they explored food science concepts in their experiments and food activities done in teams. The programs supported a sense of belonging, mastery and independence, which are part of the Extension philosophy of education.

Evaluation and Data Analysis

The program was evaluated using pre/post surveys based on the course content conducted with children and parents, with analysis using the SPSS software program.¹⁵ For this case report, we employed a descriptive study process to determine the outcomes of the project. All children and their parents were invited to participate in the descriptive surveys, which were deemed “exempt from federal regulations” according to the Institutional Review

Board for the protection of human subjects. The children and adults could decline participation in the surveys, and the protocol did not allow us to collect identifying information. The survey evaluation also collected written comments from children and parents. We did not collect body weights because of the relatively short duration of the program.

Results

The program has reached 1,600 children, including 400 children who participated online through various platforms, during the early stages of the pandemic. Our analysis showed significant increases ($p < .05$) in the children's overall knowledge scores related to measuring, kitchen equipment, and nutrition concepts based on MyPlate.gov and Nutrition Facts labeling. Perhaps more important than knowledge gain, children reported behavior changes after participating in nutrition, food safety and culinary education. Summary evaluation data showed the following results:

- 98% of participating children reported being somewhat to totally confident reading and following a recipe.
- 80% had told others about cooking school.
- 78% were eating more fruit.
- 66% were eating more vegetables.
- 59% were eating more whole grains.
- 87% of children planned to cook more at home.
- 91% felt confident following the basics of food safety.
- 95% knew how to use the kitchen tools they received in class.
- 90% felt confident using kitchen equipment (oven, stove, stove, etc.).

In follow-up surveys, parents/guardians reported their children being more independent at home (78%), offering help at home (79%), being confident in the kitchen using measuring tools and other equipment (73%), among many observations. Parents and children provided robust comments and success stories that included changes in eating behavior and use of the skills and tools they received.

- "This class helped my children become more knowledgeable with reading food labels and being open to trying new foods!" – Parent
- "My child has been very interested in helping/doing things himself in the kitchen, getting his own snack, getting a knife and

cutting his own banana so he can practice cutting, and just being more aware/helpful in the kitchen overall, including clearing his plate." – Parent

- "My son has never eaten fruits and vegetables like this, and he is discovering he actually likes them." – Parent
- "I liked that we learned about what I am putting in my body. I could think it is good, but it is not!" – Child
- "Cooking school is the best thing in the entire world!" – Child

Discussion

The program was not carried out as an "experiment" but, rather, as a case study in community settings. Different instructors have different teaching styles, with some personalizing the content with their own teaching ideas. Despite this variability in instruction for the 1,600 participants, all of the instructors taught about MyPlate, measuring, cutting and other skills from the curriculum. The children showed significant knowledge gains and positive self-reported behavior changes.

As shown by the evaluation results and comments from children and parents, culinary education for children can increase children's nutrition and food safety knowledge, improve their confidence and skills in using kitchen tools, and enhance their ability to help in their homes. Nearly all (98%) of the participating children reported they were confident or totally confident using the measuring tools introduced in their hands-on activities.

Children reported consuming more fruits, vegetables and whole grains, which were concepts included in the objectives. This concurs with previous research studies showing positive nutritional intake changes, but those studies were with smaller groups of children.^{11, 12, 13} The parents made many enthusiastic written comments about their children's eating behavior at home, as well as their contributions to the meal preparation for their families.

This case study provided evidence that culinary education can influence short-term eating behavior and, potentially, change their food consumption behavior in the long-term. Programs that provide hands-on culinary education are not only enjoyable for children, but they provide lifelong skills. The programs also encouraged eating more often as a family, which has been shown to improve family

eating behaviors, reduce risk of alcohol/drug use, improve mental health, and improve communication skills.⁴

In the online live versions of the class, which reached children in their home kitchens via the Internet, parents often took part in the class simultaneously with their children. The online instructors noted that some of the parents appeared to have little experience and/or knowledge of the concepts their children were learning, including current nutrition recommendations, and food science/safety concepts associated with food preparation concepts. As a result of these observations, we encourage other educators to involve both the parents and children in parent-child classes, when possible. Learning concepts together and trying new foods and new recipes may encourage the ongoing use of those foods and recipes. Habits that begin early in life can far-reaching effects on health, including potential reductions in heart disease, cancer, diabetes and other chronic conditions.⁷

Based on the success of these programs on children's knowledge, skills and behavior, the program is continuing and expanding with new science-based lessons to reach preschool children with basic nutrition, food preparation, and food science/safety concepts. In addition, new programs are being developed to reach teenage audiences with more challenging concepts that explore advanced culinary techniques, food science, agricultural commodities and their use in the food supply, food processing, and potential careers in the food industry.

Our data was based on children's self-reported food intake; however, the parents/guardians provided additional information that showed that our cooking schools made a difference, at least in the short term, on food intake at home. A longer-term research study with experimental groups and control groups could evaluate the influence of knowledge and cooking skills on body mass index. The author also is exploring evaluation strategies to determine long-term behavior changes of nutrition education outreach.

Limitations

Some limitations of this project are evident. This was not set up as a controlled "experiment" but, rather, as a community-based educational program. In addition, the lessons were taught by different people in at least 30 locations; however, they

followed a written curriculum with specific concepts to cover in each lesson. The children self-reported their behavior. We asked them if they ate "more" vegetables instead of a specific additional amount. In the future, observations or videotaping of children's culinary skills by trained researchers could provide more robust analysis of their learning and confidence. In addition to collecting their comments, qualitative interviews could be conducted with the parents and/or children. As a result of the category of our Institutional Review Board approval, we were not able to collect names and match pre/post surveys to conduct more complex paired-comparison statistical analysis, which could be a direction for the future. We used frequencies/means to show self-reported changes in the children's behavior.

Conclusion

Culinary education can have positive impacts for children and families on the children's knowledge of culinary concepts and, potentially, in improving lifelong food preparation skills. Children who learn how to prepare fruits and vegetables have been shown to consume a diet closer to the recommendations ("fill half your plate with fruits and vegetables"). Nutritional intake throughout the lifespan can influence overall health and reduce risk for several chronic diseases. We encourage medical and community health practitioners to promote both family mealtimes and hands-on nutrition and culinary education for children and families. Both practices have the potential to influence immediate and lifelong health of the children and members of their families.

Conflicts of Interest

There are no conflicts of interest.

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