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RESEARCH ARTICLE

Cooking with the Community: Addressing Food Insecurity Through Equipment Provision and Professional Instruction



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Introduction: Food insecurity is a common problem with many associated negative downstream health impacts. Despite government sponsored and private supports, many individuals struggle with making healthy, nutritious meals. Penn State's Cooking with the Community program was constructed with the objective of providing cooking equipment and instructions to increase knowledge of healthy cooking techniques and consumption of under-utilized food pantry ingredients.

Methods: Four cooking demonstrations were held over an 8-month study period in 2021 designed to educate participants on under-utilized and seasonally available ingredients. Each demonstration was professionally led by a chef who taught cooking skills and the use of different equipment, which were subsequently gifted to the participants. Participants were surveyed before and after each demonstration to assess cooking perceptions and comfort using Likert scales. Final analysis was completed in 2022 using mixed effects models to analyze changes between pre- and post-demonstration.

Results: There were 34 total participants. Statistically significant improvements were seen in confidence in cooking (mean increase=0.5; SD=0.2; $p=0.031$; 95% CI=0.1, 1.0), preparation of a simple recipe (mean increase=0.6; SD=0.2; $p=0.013$; 95% CI=0.1, 1.0), and cooking new foods (mean increase=0.6; SD=0.3; $p=0.026$; 95% CI=0.1, 1.1).

Conclusions: Cooking with the Community provides valuable information on how cooking confidence may be boosted within vulnerable populations by providing cooking equipment and professional instructions on its use.

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INTRODUCTION

Food security is the measure of the availability of food and an ability to access it.¹ The U.S. Department of Agriculture (USDA) Economic Research Service analyzed 134 countries and identified 5 characteristics that are strongly associated with food insecurity. These include low levels of education, weak social networks, limited social capital, low household income, and

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unemployment.² Food insecure children aged <4 years have also been found to be more likely to have poor health, develop or have exacerbated conditions such as asthma, and have depressive symptoms.^{3,4} Poor dietary quality is directly related to increased risk of chronic conditions such as diabetes and cardiovascular disease, as well as increased presence of inflammatory biomarkers.^{1,5,6} Choosing healthy, nutrient-rich food options can be difficult for families because of costs, lack of access, and challenges in understanding culinary concepts.⁷ Dietary quality is closely correlated with socioeconomic status; higher-income families consume diets higher in fiber and vegetables and lower in fats.⁶ Prior research has also shown that food insecure families often have less knowledge of healthy cooking skills.^{4,7,8} Thus, interventions are required to address the complexities affecting food security of families.

The Cooking with the Community program therefore was established with the objective of helping families prepare healthy meal options. Through Community Access to Child Health funding, participants were provided with free cooking equipment and recipes combined with additional food supplies at a local food pantry in Harrisburg, Pennsylvania, where patrons were invited to join professional chef–led cooking demonstrations.

METHODS

Study Population

Participants were initially recruited using food pantry flyers and church announcements. Recruitment efforts were adapted after the first demonstration to include church website advertising and printed flyers for upcoming demonstrations being given to participants to help increase word-of-mouth advertising. Participants received informed consent and included food pantry patrons who attended at least 1 of 4 hour-long cooking demonstrations held outdoors on May 5, July 14, September 8, and November 17, 2021. Demonstrations were led by a volunteer professionally-trained chef who focused on underutilized and seasonally available ingredients, taught a cooking skill, and demonstrated the use of different cooking equipment, which was subsequently gifted to the participants. Demonstration 1 focused on knife skills and safety while sautéing on stove top. Demonstration 2 provided instruction on grilling techniques and temperatures to safely cook meats. Demonstration 3 focused on the use of a cooking pot and safe food storage. The final demonstration provided instruction on oven safety, roasting, and baking skills. Descriptions of each cooking demonstration are summarized in [Table 1](#). Health and safety information related to cooking were

provided at each event by general pediatricians and medical students.

Measures

Participants were surveyed before and after each demonstration regarding behaviors and attitudes related to meal preparation. Surveys included basic demographic information including age, sex, race, ethnicity, and education level. Assessments focused on 5 areas: confidence in cooking, recipe preparation, cooking new foods, tasting new foods, and comfort in cooking. Each used a 10-point Likert scale with higher scores indicating more confidence. Post-survey questions included the likelihood of trying new foods, preparing meals with fresh basic ingredients, and cooking meals with their children. Survey data were entered into Research Electronic Data Capture, a secure online tool to support research studies.^{9,10}

Statistical Analysis

Mixed-effects linear regression models were used to assess changes over time when combining data from all demonstrations. The models contained a fixed effect for time (pre versus post) and a random effect for participant. Paired *t*-tests were used when each demonstration was analyzed individually. This study was approved by the Penn State College of Medicine IRB.

RESULTS

There were 34 unique participants, and 32% attended ≥ 1 food demonstration. There were 3, 12, 14, and 20 participants who attended Demonstrations 1, 2, 3, and 4, respectively. Participants were mostly aged >45 years (53%), female (71%), Black or African American (53%), non-Hispanic (71%), and with a high school degree or beyond (77%; [Table 2](#)).

Participant responses for pre- and post-survey questions for all demonstrations combined are illustrated in [Figure 1](#). When all 4 demonstrations were combined, statistically significant improvements were seen for confidence in cooking (mean increase of 0.5; $p=0.031$; 95% CI=0.1, 1.0), for confidence in preparation of a simple recipe (mean increase of 0.6; $p=0.013$; 95% CI=0.1, 1.0), and for confidence in cooking new foods (mean increase of 0.6; $p=0.026$; 95% CI=0.1, 1.1). Comfort in cooking (mean increase of 0.2; $p=0.38$; 95% CI= -0.2, 0.6) and confidence in tasting new foods (mean increase of 0.4; $p=0.08$; 95% CI= -0.1, 0.9) did not show statistically significant improvement. The 4 cooking demonstrations were also analyzed individually ([Table 3](#)).

Tests were not completed on the first demonstration owing to the small sample size (N=3). The second

Table 1. Description of Cooking Demonstrations

Demonstration	Equipment provided	Targeted cooking skills	Ingredients utilized
1	<ul style="list-style-type: none"> • Cutting boards • Sauté pan • Knives • Mixing bowls • Measuring cups • Measuring spoons • Can opener • Tongs • Rubber spatulas 	<ul style="list-style-type: none"> • Knife skills and safety • Sautéing 	<ul style="list-style-type: none"> • Ground turkey • Plain yogurt • Canned tomatoes • Brown rice • Shredded cheese • Canned beans
2	<ul style="list-style-type: none"> • Grill Pan • Meat thermometer • Spatula 	<ul style="list-style-type: none"> • Grilling • Food preparation safety • Safe minimum internal temperatures for cooking meats 	<ul style="list-style-type: none"> • Corn • Zucchini • Broccoli • Limes • Buns • Shredded cheese • Ground beef • Taco seasoning
3	<ul style="list-style-type: none"> • Cooking pot • Cooking spoons • Food storage containers 	<ul style="list-style-type: none"> • Cooking-pot use • Food-storage safety 	<ul style="list-style-type: none"> • Canned chicken • Mayonnaise • Pickle relish • Sliced bread • Cream of chicken soup
4	<ul style="list-style-type: none"> • Baking Dish • Spatulas • Wire whisk • Hot mitts 	<ul style="list-style-type: none"> • Baking • Roasting • Oven safety 	<ul style="list-style-type: none"> • Canned beans • Shredded cheese • Whole wheat tortillas • Carrots

Note: Unused equipment from early demonstrations was given away on subsequent cooking demonstrations to new participants.

Table 2. Participant Demographics

Characteristic	All participants (N=34), n (% of sample)
Age, years	
<25	1 (2.9%)
25 to 44	15 (44.1%)
>45	18 (52.9%)
Sex	
Male	8 (23.5%)
Female	24 (70.6%)
Other	1 (2.9%)
Prefer not to answer	1 (2.9%)
Race	
Information not included	1 (2.9%)
Black or African American	18 (52.9%)
White	12 (35.3%)
Prefer not to answer	3 (8.8%)
Ethnicity	
Hispanic or Latinx	3 (8.8%)
Non-Hispanic/Latinx	24 (70.6%)
Prefer not to answer	7 (20.6%)
Education	
Less than high school	4 (11.8%)
High school graduate	10 (29.4%)
More than high school	16 (47.1%)
Prefer not to answer	4 (11.8%)

and fourth demonstrations did not show significant improvements in any survey response. The third cooking demonstration showed statistically significant improvements in confidence in cooking (mean increase of 1.3; $p=0.002$; 95% CI=0.7, 1.8) and confidence in trying a new food (mean increase of 1.0; $p=0.009$; 95% CI=0.3, 1.7).

DISCUSSION

A series of 4 cooking demonstrations delivered at a food pantry with accompanying gifts of relevant cooking equipment resulted in increased confidence in cooking, preparation of a simple recipe, and cooking new foods. Existing literature suggest that food demonstrations and cooking interventions at food pantries show similar improvements in cooking skills.^{11,12} There are no other studies to the best of our knowledge that provide cooking equipment to encourage sustained changes in cooking behaviors. The authors predict that the combination of cooking demonstrations and provision of cooking equipment and ingredients helped our participants change their confidence in cooking skills.

Before surveys showed higher confidence in cooking than expected, which suggests additional barriers to food security of participants such as low levels of

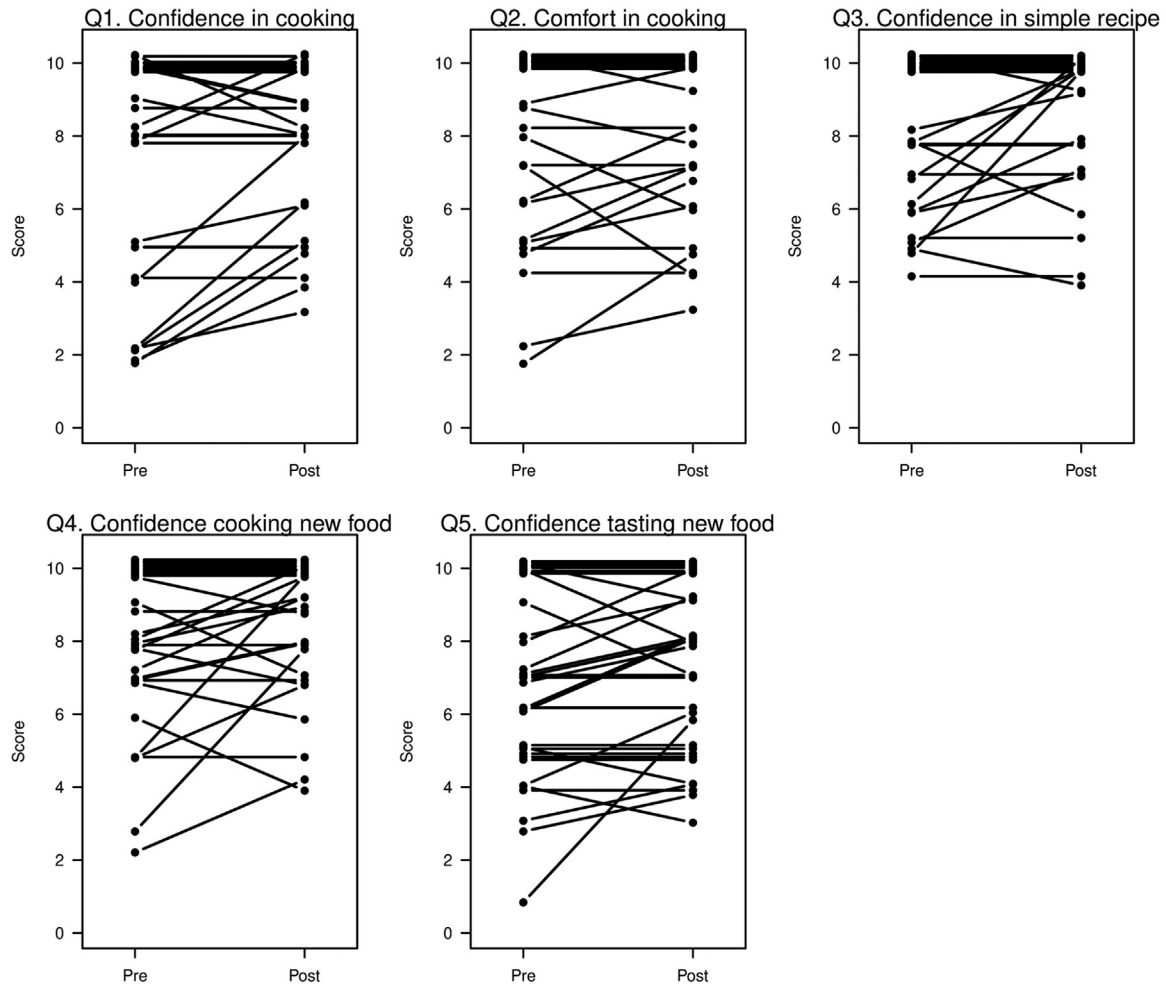


Figure 1. Pre- and post-cooking responses for each survey question when all 4 cooking demonstrations were combined.
 Note: Line segments indicate the same participant and any associated change between pre-test versus post-test scoring.

education and food literacy, weak social networks, limited social capital, low household income, and unemployment.^{2,13,14} Although participants may have had prior knowledge of cooking, an understanding of using less popular ingredients may have been lacking, further weakening food security.

As illustrated by the increasing number of participants at each cooking demonstration, excitement about the program grew among families. Significant increase in confidence in cooking, both in following recipes and in cooking with new foods, was seen over the course of 4 cooking demonstrations but not before and after 2 of the 4 demonstrations, showing a longitudinal relationship is needed. The coronavirus disease 2019 (COVID-19) pandemic severely limited local access to public resources such as food pantries. This study helped to demonstrate the value of creatively re-engaging community members in local resources that may have been interrupted.

Limitations

This study is limited in including a convenience sample of patrons of a local food pantry and does not include a control group or long-term follow-up. The overall sample size was small and likely impacted by the effect of the COVID-19 pandemic and resultant shifting locations of community resources. Because of the limited existing literature on validated pre- and post-surveys to assess food demonstrations at the pantry, the research team designed the survey questions. It is possible that limited literacy impacted the responses; however, most participants had at least a high school education. In addition, the survey was only provided in English.

CONCLUSIONS

Food insecurity has broad-reaching health impacts. Cooking with the Community provides valuable information on how cooking confidence may be boosted

Table 3. Means and SDs of Survey Questions Asked Before and After Each Demonstration

Demonstration	Pre-survey, mean (SD)	Post-survey, mean (SD)
Demonstration 1 (N=3)		
Q1. Confidence in cooking	7.3 (2.1)	8.0 (2.7)
Q2. Comfort in cooking ^a	8.0 (-)	8.0 (-)
Q3. Confidence in simple recipe	7.7 (2.5)	9.3 (1.2)
Q4. Confidence cooking new food	7.7 (2.5)	9.3 (1.2)
Q5. Confidence tasting new food	6.3 (2.3)	5.7 (1.2)
Demonstration 2 (N=12)		
Q1. Confidence in cooking	7.3 (3.8)	8.3 (2.3)
Q2. Comfort in cooking	6.8 (3.2)	7.8 (2.4)
Q3. Confidence in simple recipe	8.4 (2.1)	8.8 (2.0)
Q4. Confidence cooking new food	8.5 (1.9)	8.6 (2.0)
Q5. Confidence tasting new food	7.8 (2.3)	7.3 (2.2)
Demonstration 3 (N=14)		
Q1. Confidence in cooking	6.7 (2.8)	7.4 (1.9)
Q2. Comfort in cooking	7.1 (2.8)	7.8 (2.1)
Q3. Confidence in simple recipe	7.5 (1.8)	8.6 (2.3)
Q4. Confidence cooking new food	6.8 (2.2)	8.1 (1.8)
Q5. Confidence tasting new food	7.0 (2.4)	8.0 (2.2)
Demonstration 4 (N=20)		
Q1. Confidence in cooking	8.4 (2.6)	8.8 (2.2)
Q2. Comfort in cooking	8.6 (2.6)	8.5 (2.8)
Q3. Confidence in simple recipe	8.8 (1.9)	9.1 (1.5)
Q4. Confidence cooking new food	8.5 (2.0)	8.8 (1.7)
Q5. Confidence tasting new food	6.9 (2.9)	7.6 (2.5)
Overall across all demonstrations (N=34)		
Q1. Confidence in cooking	7.6 (2.9)	8.3 (2.2)
Q2. Comfort in cooking	7.7 (2.8)	8.1 (2.5)
Q3. Confidence in simple recipe	8.2 (2.0)	8.9 (1.8)
Q4. Confidence cooking new food	8.0 (2.1)	8.6 (1.7)
Q5. Confidence tasting new food	7.1 (2.5)	7.5 (2.3)

Note: Boldface indicates statistical significance ($p < 0.05$).

^aOnly 1 participant completed this question for Demonstration 1. Q, question.

within vulnerable populations by providing cooking equipment and professional instruction on its use. Additional research through a larger longitudinal study may help demonstrate the benefits of a program such as this on food security.

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CREDIT AUTHOR STATEMENT

Ryan L. Spotts: Conceptualization, Methodology, Investigation, Data curation, Writing – original draft, Project administration, Funding acquisition, Supervision. Brittany A. Massare: Conceptualization, Methodology, Investigation, Data curation, Writing – original draft, Project administration, Funding acquisition, Supervision. Madeline Matzelle-Zywicki: Investigation, Writing – original draft. Ashley Sun: Investigation, Writing – original draft. Lisa R. Yoder: Investigation, Writing – original draft. Eric W. Schaefer: Data curation, Writing – original draft. Deepa L. Sekhar: Supervision, Writing – original draft.

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