

Providing Nutrition Education at a Food Pantry Affects Food-Related Behavior of Participants

Abstract

We investigated effects of nutrition education provided to food pantry clients by trained volunteers. Specifically, we assessed effects on food security, nutrition practices, and food safety by examining the food pantry clients' intent to use beneficial kitchen practices and self-reported behavior following the education. Participants who engaged in at least one educational lesson completed an intent survey after the education. After the 4-month period during which the lessons were provided, participants and members of a comparison group completed retrospective questionnaires. Participants reported both high intent to use resources and behavior change ($p \leq .05$). Offering nutrition education in food pantries is useful for participants and constitutes worthwhile Extension programming.

Keywords: [nutrition education](#), [behavior change](#), [food security](#), [volunteers](#), [food pantry](#)

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Introduction

The need exists for continued food and nutrition behavior educational outreach to food-insecure populations to improve food security and health. Researchers have documented the relationship between food insecurity and poor health and the positive correlation between nutrition education and health outcomes (Crouch & Dickes, 2016; Eicher-Miller, Mason, Abbott, McCabe, & Boushey, 2009; Lombe, Nebbitt, Sinha, & Reynolds, 2016; Mobley, 2012; Rivera, Maulding, Abbott, Craig, & Eicher-Miller, 2016; Wood, Shultz, Butkus, & Ballejos, 2009). Chronic use of emergency food assistance continues to drive the need for action. Food pantry clients are a target population for improving nutrition-related behavior given evidence of poor diet

quality and limited resources associated with this group (Duffy, Zizza, Jacoby, & Tayie, 2009; Wood et al., 2009; Yao et al., 2013). Providing nutrition education in food pantries takes advantage of locations food-insecure individuals frequent and increases participation in education (Hardison-Moody et al., 2015; Mobley, 2012). Intention related to nutrition behaviors can be affected by perceptions surrounding lack of time, lack of convenience given one's lifestyle, lack of clarity about the benefits of eating a food, high cost of a food, or inferior taste of a food (Ajzen, 1991; Lombe et al., 2016; Yao et al., 2013). Targeting educational messages to provide practical, useful education to food-insecure adults is helpful in motivating individuals to adopt new, healthful behaviors (Clarke, Evans, & Hovy, 2011). Our purpose in conducting the research described here was to investigate intent to use beneficial kitchen practices as well as changes in food security and food-related behaviors among food pantry clients as a result of participating in volunteer-led education.

Methods

The University of Maine Institutional Review Board for the Protection of Human Subjects approved our research project. The research was a quasi-experimental design involving intervention and comparison groups. Participants were Maine residents who used food pantries. Eligibility criteria ensured that participants were 18 years or older and met the specific criteria for food pantry use. Approval to conduct research at two pantries was obtained; one pantry was designated for conducting the intervention and the other for assessing the comparison group. During 2015, we created the educational lessons between June and August, recruited volunteers in September and October, and trained volunteers in November and December. Following those preparations, we implemented the project in 2016. Volunteers delivered the educational lessons and provided associated essential items (e.g., strainers for rinsing food, plastic containers for freezing food) to intervention group participants, and intervention group participants completed intent surveys. Comparison group participants did not receive the educational lessons. After the education, we evaluated behavior through a self-administered retrospective questionnaire completed by both groups. The project implementation timeline is shown in Table 1.

Table 1.

Project Implementation Timeline, 2016

Detail	January	February	March	April	May	June
Lesson delivery	X	X	X	X		
Beans	X					
Rice		X				
Rolled oats			X			
Meat					X	
Intent survey	X	X	X	X		
Mailed questionnaire						X
Return date						X

Educational Lesson Creation

We developed a series of four educational lessons. The educational lessons were created around commonly

available, healthful food pantry staples that typically are not selected by pantry clients. Participants were asked to engage in a 3-min education session conducted by a trained volunteer educator. Considering the food pantry setting, we designed informal conversation-based lessons centered on the key topics and learning outcomes listed in Table 2.

Table 2.
Overview of Educational Lessons

Topic	Lesson objectives
Beans	Participants will be able to identify: <ul style="list-style-type: none"> • how to properly prepare canned beans • how to prepare dry beans • how to freeze cooked dry beans
Rice	Participants will be able to identify: <ul style="list-style-type: none"> • the steps for cooking brown rice • how to store rice for later use by freezing
Rolled oats	Participants will be able to identify: <ul style="list-style-type: none"> • the difference between a refined grain and a whole grain • how to safely store whole grains • benefits of whole grains for a healthy diet
Meat	Participants will be able to identify: <ul style="list-style-type: none"> • how to safely handle raw meat • how to thaw frozen meat properly • how to cook raw meat to the correct internal temperature

Volunteer Training

Using the train-the-trainer model, we trained volunteers to deliver targeted nutrition, food preparation, and food safety education at the intervention food pantry. Volunteers were local community members not affiliated with the selected pantries in the study. Content of the training is described in Table 3. Group trainings, led by a member of our research team, lasted 3.5 hr each and included presentation, discussion, and hands-on skill and recipe demonstration.

Table 3.

Volunteer Educator Training Content

Class	Topics
1	Introduction to program Home food safety Food safety during cooking demonstrations Food storage Knife skills
2	Research training for human subjects Food preparation and cooking techniques Conducting food demonstrations Introduction of educational lessons 1–4
3	Poverty awareness Movie <i>A Place at the Table</i> , by Lori Silverbush and Kristi Jacobson (2012) Class activities: Case studies, book and movie review
4	Mock food demonstrations Collecting evaluation surveys Being a Cooperative Extension volunteer

Data Collection

We used a multiple-method approach involving surveys administered in person and mailed. To collect data, we disseminated an instrument comprising a five-item de novo intent survey (Ajzen, 1991) and demographics questions to consented intervention participants visiting the pantry from January through April. We limited a participant's completion of the survey to one time per month. The survey was self-administered and assessed participants' intent to use the educational information and materials received. The response set for the first four items on the intent survey was a Likert scale ranging from 1 (*unlikely*) to 7 (*likely*). Through a fifth, qualitative question, participants were asked to identify one thing learned about the food item addressed during the lesson. Participants had the potential to complete the intent survey up to four times during the study period if they completed the survey each month. Participants received \$2 each time they completed an intent survey.

At the end of the 4-month education program, we mailed to intervention group participants a 15-item retrospective evaluation questionnaire that included lesson-specific questions (Table 4). We sent the first mailing in May and a second mailing in June to increase response rate. The tool was created from a pool of validated questions along with several de novo questions specific to topics addressed in the lessons (Wardlaw & Hanula, 2012). Intervention participants responded retrospectively, thinking about their circumstances and behaviors before and after the education. Participants responded to questions 1–14 of the questionnaire by choosing options on a 5-point Likert scale (1 = *never*, 2 = *rarely*, 3 = *sometimes*, 4 = *often*, 5 = *always*). For question 15, participants rated their level of agreement with the statement "It's too expensive to eat a lot of nutritious foods" by choosing options on a 5-point Likert scale (1 = *strongly disagree*, 2 = *somewhat disagree*, 3 = *neutral*, 4 = *somewhat agree*, 5 = *strongly agree*). For comparison participants, we distributed

the 15-item questionnaire, with the addition of demographics questions, at the selected food pantry during the last month of the study. The survey was self-administered, and participants responded in a manner similar to that of the intervention participants, thinking retrospectively about before and after the 4-month time frame from January through April. We entered participants from both groups in drawings for four \$25 grocery gift cards for completing the questionnaire.

Table 4.
Retrospective Evaluation Questionnaire

Question #	Question	Subscale
1	How often do you run out of food before the end of the month?	Food security
2	How often do you use resources like a food pantry or soup kitchen?	Food security
3	When deciding what to feed your family, how often do you think about healthy food choices?	Food security
4	How often do you prepare main dishes from scratch?	Nutrition behavior
5	How often do you eat cooked dry beans, like baked beans, bean soup, or refried beans?	Nutrition behavior
6	How often do you rinse canned foods before use, like beans and carrots?	Nutrition behavior
7	How often do you cook with brown rice instead of white rice?	Nutrition behavior
8	When you have leftovers, how often do you freeze them?	Food safety
9	How often do you cook with whole grains?	Nutrition behavior
10	How often do you choose to eat lean meats, like chicken and turkey?	Nutrition behavior
11	When storing food, how often do you separate raw meat, poultry, and fish from vegetables, fruits, and prepared products?	Food safety
12	When cooking, how often do you use a meat thermometer to measure the doneness of meat?	Food safety
13	How often do you thaw frozen foods (on the kitchen counter) at room temperature?	Food safety
14	Do you wash utensils in hot soapy water and surfaces that have touched raw poultry or meat before using them again?	Food safety
15	How much do you agree with the following statement: It's too expensive to eat a lot of nutritious foods.	Nutrition behavior

Note. Food security subscale: three items, score range 3–15. Nutrition behavior subscale: seven items, score range 7–35. Food safety subscale: five items, score range 5–25.

Data Analysis

For the 5-item intent survey, we calculated mean responses for each of the first four items. We synthesized qualitative data from responses to the fifth question by generating word clouds using the online software program Wordle (Feinberg, 2014). For the retrospective evaluation questionnaire, we grouped responses according to the three subscales (food security, nutrition behavior, food safety) and assessed and made comparisons of self-reported behaviors of the intervention and comparison groups.

We conducted statistical analyses using IBM SPSS Professional Version 24 for all intervention and comparison group data. We computed paired-samples *t*-tests to determine mean differences in responses to the questionnaire by subscale for both the intervention and comparison groups. We analyzed between-group differences on the questionnaire using independent-samples *t*-tests. When testing individual items, we used Bonferroni correction; otherwise, the significance level was set at $p \leq .05$.

Results

Intervention and comparison group participant characteristics are displayed in Table 5.

Table 5.
Study Participant Characteristics

Demographic variable	Intervention (<i>n</i> = 41^a)	Comparison (<i>n</i> = 95)
Gender distribution		
Female	71%	76%
Male	29%	24%
Mean age of respondents (years)	47.41±13.7	53.8±14.0 ^b
Race		
White	95%	90%
Non-White	5%	10%
Education		
< High school	10%	25%
≥ High school	90%	75%

^a42% response rate for the questionnaire from those who completed at least one intent survey. ^bStatistically significant higher mean age based on the independent-samples *t*-test ($p = .016$).

Intent survey responses ($M \pm SD$) by pantry lesson attended are listed in Table 6. Of those who visited the intervention food pantry, 91% participated in the beans lesson in January, 88% participated in the rice lesson in February, 71% participated in the rolled oats lesson in March, and 70% participated in the meat lesson in April. For participant reports of intent, which were based on a 7-point scale ranging from 1 (*unlikely*) to 7 (*likely*), means were 5.25 ± 2.3 to 6.87 ± 0.8 for all lessons for all behaviors—using the item, sharing the item, using the recipe, and practicing a health-promoting behavior. Qualitative data generated from the fifth item on the intent survey indicated overwhelmingly that participants had learned particular information represented by responses such as "rinsing canned items like beans" and "incorporating whole grains, like rolled oats, into meals."

Table 6.
Reported Behavioral Intention Values ($M \pm SD$) by Lesson Topic for Intervention Group Participants

Lesson topic	No. of participants	Use item	Share item	Use recipes	Practice behavior ^a
Beans	50	5.84±1.8	5.68±1.8	5.74±1.8	5.84±1.9
Rice	45	6.87±0.8	5.71±2.0	6.51±1.2	6.10±1.7
Rolled oats	37	6.30±1.2	5.86±1.4	6.54±0.8	6.35±1.2
Meat	40	6.85±0.6	5.65±2.1	6.50±1.09	5.25±2.3

Note. 98 participants completed ≥1 intent survey; a total of 172 intent surveys were completed over the 4 months. The intent survey was a 5-item questionnaire—4 quantitative items, 1 qualitative item; responses were based on a Likert scale ranging from 1 (*unlikely*) to 7 (*likely*).
^aMessages included rinsing canned foods, freezing cooked bagged rice, incorporating whole grains into meals, and using a meat thermometer to test doneness of meats.

Figures 1–4 are word clouds synthesizing the modal responses of intervention participant responses to the open-ended question regarding information learned during the lessons.

Figure 1.

Response Categories of Intervention Group Responses to the Intent Survey Question "What Is One Thing You Learned Today About Beans?"



Figure 2.

Response Categories of Intervention Group Responses to the Intent Survey Question "What Is One Thing You Learned Today About Rice?"



Figure 3.

Response Categories of Intervention Group Responses to the Intent Survey Question "What Is One Thing You Learned Today About Rolled Oats?"



Figure 4.

Response Categories of Intervention Group Responses to the Intent Survey Question "What Is One Thing You Learned Today About Meat?"



Retrospective evaluation responses ($M \pm SD$) for the intervention group by subscale are shown in Table 7. We identified statistically significant improvements in food security, nutrition behavior, and food safety. Specifically, intervention group participants reported preparing main dishes from scratch, eating cooked dry beans, and cooking with brown rice instead of white rice more often after than before the lessons.

Table 7.

Retrospective Evaluation Responses ($M \pm SD$) of Intervention Group Participants ($n = 41$)

Questionnaire subscale	Pre $M \pm SD$	Post $M \pm SD$	Value of t^a
Food security	10.95 ± 2.19	9.98 ± 2.21***	3.53
Nutrition behavior	21.95 ± 5.20	24.05 ± 5.37**	-3.25
Food safety	17.05 ± 2.37	17.80 ± 2.47*	-2.54

Note. Pre refers to before educational intervention time period; post refers to after educational intervention time period. 15-item questionnaire: food security subscale = 3 items, score range = 3–15; nutrition behavior subscale = 7 items, score range = 7–35; food safety subscale = 5 items, score range = 5–25.

^aNegative t value = higher posttest score, positive t value = lower posttest score.

* $p = .015$. ** $p = .002$. *** $p = .001$.

Retrospective evaluation responses ($M \pm SD$) for the comparison group by subscale are shown in Table 8. We did not find statistically significant improvements for the comparison group.

Table 8.

Retrospective Evaluation Responses ($M \pm SD$) of Comparison Group Participants ($n = 95$)

Pre

Post

Questionnaire subscale	<i>M</i> ± <i>SD</i>	<i>M</i> ± <i>SD</i>	Value of <i>t</i> ^{a,b}
Food security	10.81±2.40	10.53±2.42	1.781
Nutrition behavior	23.35±5.39	23.57±5.13	-0.989
Food safety	17.42±3.26	17.46±3.20	-0.304

Note. *Pre* refers to before educational intervention time period; *post* refers to after educational intervention time period. 15-item questionnaire: food security subscale = 3 items, score range = 3–15; nutrition behavior subscale = 7 items, score range = 7–35; food safety subscale = 5 items, score range = 5–25.

^aNegative *t* value = higher posttest score, positive *t* value = lower posttest score. ^bNo significance found when *p* ≤ .05.

Retrospective evaluation responses (*M*±*SD*) for the intervention and comparison groups by subscale are shown in Table 9. We did not find statistically significant differences between the groups for "pre" (before educational intervention time period) or "post" (after educational intervention time period) responses related to food security, nutrition behavior, or food safety.

Table 9.

Retrospective Evaluation Responses (*M*±*SD*) of Comparison and Intervention Groups

Time frame considered	Comparison	Intervention	Value of <i>t</i> ^{a,b}
	(<i>n</i> = 95)	(<i>n</i> = 41)	
	<i>M</i> ± <i>SD</i>	<i>M</i> ± <i>SD</i>	
Food security			
Pre	10.81±2.40	10.95±2.19	-0.322
Post	10.53±2.42	9.98±2.21	1.249
Nutrition behavior			
Pre	23.35±5.39	21.95±5.20	1.400
Post	23.57±5.13	24.05±5.37	-0.495
Food safety			
Pre	17.05±3.26	17.05±2.37	0.747
Post	17.46±3.20	17.80±2.47	-0.675

Note. *Pre* refers to before educational intervention time period; *post* refers to after educational intervention time period. 15-item questionnaire: food security subscale = 3 items, score range = 3–15; nutrition behavior subscale = 7 items, score range = 7–35; food safety subscale = 5 items, score range = 5–25.

^aNegative *t* value = higher posttest score, positive *t* value = lower posttest score. ^bNo significance found between intervention and comparison groups when *p* ≤ .05.

Discussion and Implications for Extension

The nutrition education delivered by trained volunteers had a positive influence on self-reported behavior change of intervention participants related to food security, nutrition behavior, and food safety, similar to other programming conducted with low-income individuals (Eicher-Miller et al., 2009; Hardison-Moody et al., 2015; Rivera et al., 2016). We found that participants engaged in more beneficial food-related practices

following education. Those who did not receive education maintained their original behaviors—whether positive or negative. Intervention group participants reported improved food security, which could have been due to educational messages about food resource management practices. Although we measured behavioral intention separately from actual behavior change, it appears that participants who engaged in food pantry education delivered by trained volunteers were thinking about the messages delivered and how they might be able to apply them in their own lives.

We designed the intervention to account for several barriers to providing nutrition education in the food pantry setting. By anticipating participant barriers, we likely helped improve the success of the program. On-site taste-test options allowed participants to try food items in new ways without the risk of wasting food if a recipe were not accepted in the household. Given the limited financial resources of the study population, essential items, such as strainers for rinsing beans and plastic containers for freezing rice and leftovers, were provided, thereby eliminating barriers to implementing healthful behaviors at home. Recipes were designed to be low cost and simple and to include few ingredients. We also made an attempt to keep readability of all educational materials at a sixth-grade level or less.

Statistically significant differences were not observed between comparison and intervention groups given that comparison participants responded positively on the 15-item retrospective evaluation questionnaire. It is possible that the comparison group may have received education elsewhere via schooling or community programming. In future studies, it would be important to assess prior nutrition knowledge or related factors before evaluation. It is also possible that the intervention group had a better understanding of their behavioral improvements after receiving education compared to comparison participants and so rated their retrospective questionnaire "pre" responses more appropriately. Long-term evaluation of sustained behavior change may be of interest in future studies.

The results of the research described here demonstrate that nutrition education in food pantries provided by trained volunteers influences healthful behaviors. The findings can provide insight to other Extension professionals who are considering designing, implementing, and evaluating educational interventions at food pantries. The survey tools, which measured short-term intent to change behavior immediately following nutrition education as well as food-related behavior change, were simple to implement but generated quality evaluation data from participants.

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