International Journal of Social Science and Education Research Studies

ISSN(print): 2770-2782, ISSN(online): 2770-2790

Volume 02 Issue 06 June 2022

DOI: https://doi.org/10.55677/ijssers/V02I06Y2022-01, Impact Factor: 4.638

Page No : 143-153

A Secondary Program Evaluation of Arkansas' Cooking Matters Program

Tracey Marie Barnett McElwee, Ph.D., LMSW[1], Allison J. Ames, Ph.D.[2]

[1]Assistant Professor, School of Social Work, College of Business, Health, and Human Services
University of Arkansas at Little Rock
[2] Assistant Professor, Rehabilitation, Human Resources, and Communication Disorders
College of Education and Health Professions, University of Arkansas

ABSTRACT

Objective: Evaluate the effectiveness of Cooking Matters *for Adults* in the U.S. state of Arkansas and the differential impact of the program for SNAP participants.
Design: Secondary program evaluation
Setting: This study aggregates data from over 100 implementations of Cooking Matters in Arkansas.
Participants: Participants were predominantly female (79.42%), Caucasian (51.33%), and aged 60 or older (28.82%) with an average of 2.89 household members.
Intervention: Cooking Matters helps families to shop for and cook healthy meals on a budget, as part of Share Our Strength's No Kid Hungry campaign
Main Outcome Measure(s): Cooking Matters Survey scale scores
Analysis: Repeated measures ANOVA
Results: Participant perceptions of cooking confidence, dietary choices, dietary patterns, healthy food preparation, and food resource management significantly increased from pre- to post- Cooking Matters program. Perceptions of cooking barriers decreased from pre- to post- Cooking Matters program. SNAP participants had differential changes in perception of cooking barriers when compared to non-SNAP participants.
Conclusions and Implications: Arkansas' findings reflect the national impact evaluation. All Cooking Matters participants benefited from the program regardless of sex, race, and educational status. Cooking Matters transcends across multiple demographic groups and is an effective program for addressing food insecurity and hunger.

***Published Online: 01 June 2022**

Keywords:
dietary behavior, nutrition knowledge, self-efficacy, poverty, food insecurity, hunger, food resource management

INTRODUCTION

In 2017, over half a million (515,270) individuals residing in the state of Arkansas met the criteria for being food insecure. This equates to approximately 17.3% of Arkansans not having consistent availability of nutritionally adequate and safe foods to live a productive and healthy life.[1-2] According to Feeding America's Map the Meal Gap, Arkansas comes in second, following Mississippi, for being the state with the second highest rate of food insecurity.

Corresponding Author: Tracey Marie Barnett McElwee,

Cite this Article: Tracey Marie Barnett McElwee, Ph.D., LMS1, Allison J. Ames, Ph.D. (2022). A Secondary Program Evaluation of Arkansas' Cooking Matters Program. International Journal of Social Science and Education Research Studies, 2(6), 143-153

More than 13 million children (17.9%) in the United States (U.S.) are food insecure, but 27.5% of children in Arkansas are living in food insecure households.[3] The Supplemental Nutrition Assistance Program (SNAP) is designed to reduce food insecurity and it provides low-income families with money to purchase food, with approximately 20 million U.S. children relying on SNAP benefits.

Food resource management is a practice that aims to increase comparison shopping, encourage the art of planning meals ahead of time, and searching for the best shopping deals. Scholars have studied the food purchasing practices of low-income women and found that if these participants were to receive more skills training in food resource management, they would be able to improve the quantity and quality of the foods purchased for their households[4]. Among participants who utilized food pantries, Martin and colleagues found that

those who made a shopping list before visiting the grocery store and those who planned meals ahead of time saw positive associations with food security[5]. Food resource management is a key program outcome in the federally funded nutrition education program: Expanded Food and Nutrition Education Program (EFNEP). A study of Arkansas EFNEP participants saw an increase in food resource management such as shopping with a grocery list and planning meals ahead of time[6]. Similar results also emerged from the Eating Smart-Being Active program[7]. Previous studies have shown that after six months of participating in the SNAP program, participants saw a decrease in food insecurity by about five to 10 percentage points, including households with food insecurity among children.[8] However, 23% of SNAP recipients still remain food insecure.[9] Additional food resource management education may be beneficial to SNAP participants to increase the realized benefits of SNAP.

Combatting Food Insecurity

Cooking Matters (CM) is a 6-week course designed to provide low-income families with the skills needed to stretch their food dollars and prepare healthy affordable meals at home. This type of food resource management course is a recognized component of reducing food insecurity.[10] In partnership with nutrition and culinary professionals, CM provides a hands-on teaching approach with courses designed for adults, parents, children, families, teens, and child care professionals. The CM approach is multifaceted, comprised of grocery store tours, cooking classes, educational tools, and online programming. Over 126 organizations in Arkansas have implemented CM leading to approximately 1,188 adult and 1,554 child program graduates.[11]

A national impact evaluation conducted by Altarum Institute indicated that CM was effective at strengthening food resource management skills and confidence building in a nutrition education program.[12] Pooler and colleagues used CM participant samples from California, Colorado, Maine, Massachusetts, Michigan, and Oregon for their national impact evaluation of the CM program.[13] While these findings are promising for addressing food insecurity among low-income families, the evaluation did not include any states from the southern region of the United States, which tend to have higher levels of food insecurity.[2] As can be seen in Table 1,[2] over half of the studies included in the Cooking Matters national impact evaluation were at or below the national food insecurity rate (12.9%); Michigan had the highest rate of FI (14.2%). Arkansas, the second most food insecure state, has a food insecurity rate considerably higher (17.2%) and has historically high rates of food insecurity. The state of Arkansas not only has higher rates of food insecurity than the national average, but Arkansas also has higher rates of obesity and diabetes as well. For example, Arkansas ranks seventh in adult obesity with 35% of Arkansans reporting to be obese. Other states that rank high on the obesity charts similar to Arkansas are Mississippi, Oklahoma, Alabama, and Louisiana.[14] When looking at rates of diabetes in the United States, 9.4% of the U.S population has diabetes compared to 14.8% of Arkansans who have diabetes. [15-16] CM helps low income individuals learn how to shop and cook healthy foods. While surveying 55,424 individuals, Smith and colleagues found a decrease in the amount of time dedicated towards meal prepping, due to having purchased ready-to-eat meals. When they looked specifically at their low-income group, they found that this group showed the greatest decline in proportion cooking.[17] Lastly, it is also important to note food insecurity differences among ethnic minorities. Allen and colleagues found that Blacks had a higher rate of food insecurity than Whites, but Whites reported skipping meals or reducing the size of their meals more often.[18] The research literature indicates that southern states are more prone to experience varying levels of disparities. To determine the effectiveness of the CM program, it is imperative to examine the success of this program in a food insecure state.

Table 1.

Table 1. Previous Studies on Cooking Matters

State	Food Insecurity rate	% SNAP eligible (poverty eligibility threshold)
MA	9.6%	65.3% (200%)
CO	11.3%	47.2% (130%)
CA	11.7%	79.6% (200%)
OR	12.9%	70.4% (185%)
ME	13.8%	60% (185%)
MI	14.2%	73.0% (200%)
AR	17.2%	54.0% (130%)

Nutrition Knowledge, Literacy, and Self-Efficacy

Nutrition knowledge is best explained as the capacity of individuals to attain, process, and comprehend basic nutrition information.[19] Evidence suggests that individuals presented with information on healthy eating tend to respond positively by striving to attain a more nutritious diet. However, factors such as limited or inaccurate nutrition knowledge and insufficient nutrition information resulting from unreliable sources hinders those efforts.[20] The acquisition of nutrition information varies among different

subgroups. Studies have also shown that among minorities, Hispanics have an adequate amount of knowledge in nutrition, with the most common barriers to eating healthy being difficulty with reading food labels and a deficiency of knowledge in purchasing healthy foods. African-Americans were shown to have a good knowledge of nutrition, with the least common barrier to healthy eating being the ability to read food labels.[21] Additionally, Caucasians were found to be more likely than African-Americans, Hispanics, and Asians to read and interpret nutrition labels. A lack of understanding of nutrition labeling, limited time, and low literacy levels partially explain the difference. Additionally, women showed higher interest in reviewing nutrition labels than men.[22]

Reports highlighting nutrition knowledge among SNAP participants have shown mixed results. There is decreased likelihood that SNAP recipients are familiar with *MyPlate* or the Dietary Guidelines. However, they are just as likely to be wrong in their beliefs about what they should be eating as eligible non-recipients and higher-income individuals. There were some differences when examining differences across socioeconomic status and race. According to Acheampong and Haldeman, "in terms of self-efficacy, African Americans versus Hispanics were significantly more likely to be very or somewhat confident in choosing (97.8% versus 69.5%), preparing (96.7% versus 76.5%), and selecting (98.9% versus 77.2%) healthy foods for their families." [21] In spite of confidence in these areas, due to a decrease in cooking confidence among low-income individuals, they will typically experience lower demands for vegetables and fruits when compared to their higher socioeconomic status counterparts.[22]

Dietary Behaviors

Budget constraints, proximity to grocery stores, and unhealthy food environments play a key role in SNAP participants' access to food, food choices, and dietary behaviors.[23,24] Low-income families with limited means must make calculated choices when grocery shopping to ensure adequate food throughout the month, which hinders their ability to consume a nutritious, varied diet.[24] Further, evidence shows that as socioeconomic status decreases and poverty increases, access to supermarkets decreases, and availability to corner stores increases.[23] In low-income areas, SNAP expenditures are more concentrated at corner and small grocery stores with studies showing that limited access to full-service grocery stores leads to poorer diets and health.[25]

When further examining subsets of SNAP participants, it was also discovered that "women had better quality diets than men; Hispanics had better quality diets than blacks and whites; and diet quality of adults generally improved with income level, except for sodium."[26] Hispanics consumed more grains, fruit, dairy, and meat while African-Americans consumed more vegetables, although African-Americans were two times more likely to *not* meet any of the dietary recommendations than Hispanics.[21]

PURPOSE

Although Pooler and colleagues have published the results of the Cooking Matters evaluation for adults programs in California, Colorado, Maine, Massachusetts, and Oregon,[27] the results are not reported for any Southern states. Similarly, it is still unknown whether the impact of Cooking Matters differs across racial/ethnic, gender, educational, and federal food assistant program groups. Cooking Matters may be beneficial for SNAP participants, as previous research has indicated SNAP participants might benefit from additional nutrition education programs. The current study had two primary objectives. First, this study aims to assess the efficacy of the program for Arkansas adults, a state with high rates of food insecurity. Pooler and colleagues [27] looked at evaluating CM and found that CM had good program results in regards to food resource management strategies. This study continues to evaluate the efficacy of CM by looking at results in Arkansas. The second objective is to investigate possible differences in participant perceptions of cooking barriers, cooking confidence, dietary choices, dietary patterns, healthy food preparation, and food resource management across racial/ethnic, gender, educational, and federal food assistant program groups.

METHODS

Data for this study were obtained from the Cooking Matters national database from 2014-2017 for the state of Arkansas. Therefore, no data were collected by the researchers for the current study and all personally identifiable information was removed before the researchers received the data. Although the state of Arkansas has implemented CM for a number of years, the earliest data available is for 2014. The current study did not fall under the domain of human subjects research, therefore the Institutional Review Board (IRB) at the first author's home institution declared the project as not qualifying as human subjects research and did not require review of the IRB.

Arkansas adults who completed the Cooking Matters free, voluntary six-week course made up the study population. Participants completed a survey at the beginning of the course and again at the end of the course describing their knowledge, skills, and behaviors. The Cooking Matters for Adults survey measures changes in skills and behaviors, primarily focusing on food resource management practices, key behaviors for making healthy food choices, cooking skills, and at home meal preparation. The survey also measures changes in attitudes toward trying new foods, especially healthy foods like fruits, vegetables, whole grains, and low-sugar drinks. Approximately 526 adults completed the Cooking Matters for Adults surveys and demographic questions from 2014-2017.

Pinard and colleagues[28], who used cognitive interviews descriptive statistics, exploratory factor analysis (EFA), Cronbach's alpha, and paired sample t-tests in the analyses, performed initial scale development and validation. In the Pinard study, a representative sample was used from three Western states, two Midwestern states, two Southern states, and four Northeastern states. Their EFA results indicated four psychosocial factors: cooking barriers, cooking confidence, healthy food preparation, and food resource management.

Exploratory factor analysis with oblique rotation (i.e., Promax) was used to assess the internal structure of the Cooking Matters data from the Arkansas population. Six correlated factors emerged: cooking barriers, cooking confidence, healthy food choices, healthy food patterns, healthy food preparation, and food resource management. The EFA in Pinard combined the healthy food choices and preparation scales whereas our solution keeps them separate. One item did not have a strong relationship with any of the six scales: "*How often do you worry that your food might run out before you get money to buy more?*" However, because this item had the highest loading with the food resource management scale, subsequent analyses included the item on the food resource management scale. Reliability for each scale is provided in Table 3.

Computation and Description of Scale Scores (Dependent Variables)

Composite scores were calculated from the Cooking Matters for Adults survey items with negative attributes reverse scored. Each score scale is created by averaging the items that comprise the scale. Because each score scale is reported and analyzed separately, measures of reliability are computed for each scale and not the whole survey.

The Cooking Barriers Scale (CBS) comprises respondents' level of agreement with three statements: "Cooking takes too much time," "Cooking is frustrating," and "It is too much work to cook." The Likert-type scale responses for each question range from 0 (strongly disagree) to 4 (strongly agree). Higher scores on the CBS indicate higher levels of barriers to cooking within respondents. CBS scores are the result of averaging the three items on the scale.

The Cooking Confidence Scale (CCS) is computed as the average of four questions from respondents' level of cooking confidence. Higher scores on the CCS indicate higher confidence in cooking.

The Changes in Dietary Choices Scale (CDCS) measures healthful choices that participants may make across six questions (e.g., "When you have milk, how often do you choose low-fat milk (skim or 1 percent)?"). Each item is rated on a 5-point Likert-type scale ranging from 0 (never) to 4 (always). Higher scores on the CDCS indicate more healthful trends in dietary choices. Previous research[29] has analyzed these items individually. Because the scale had high reliability, and all items are considered indicators of changes in dietary choices, the scale scores were computed as the average of the six items.

The Dietary Patterns Scale (DPS) assesses how often respondents typically eat or drink 10 items (e.g., "fruits like apples, bananas, or melons" and "Fried potatoes, like home fries, hash browns, or tater tots"). Each item is rated on a 5-point Likert-type scale: not at all (0), once a week or less (1), more than once a week (2), once a day (3), and more than once a day (4). Increases in the scale over time for most items will indicate improved dietary patterns, while decreases in consumption of fried potatoes, out-of-home meals, and soda will show positive changes in healthful eating. Items related to consumption of fried potatoes, out-of-home meals, and soda were reverse coded so that higher scores indicate more healthful dietary patterns on all items. Reliability for both the pre- and post- Cooking Matters DPS was lower than desirable[18].

The Healthy Food Preparation Scale (HFPS) is comprised of eight questions, six assessing the frequency of healthy behaviors (e.g., "How often do you eat food from each food group every day?") and two assessing respondents' confidence in food preparation ("How confident are you that you can choose the best-priced form of fruits and vegetables?"). Participants rated items on a Likert-type scale. The questions assessing how often the healthy behavior occurs range from 0 (never) to 4 (always), while the questions assessing confidence range from 0 (not at all confident) to 4 (very confident). The HFPS averages all responses of the eight items.

The Food Resource Management Scale (FRMS) is comprised of three items (e.g., "How confident are you that you can make your food money last all month?") with responses rated on a scale ranging from 0 (not at all confident) to 4 (very confident). Because the scale had at least marginal reliability, and all items are considered indicators of food resource management, the FRMS scores were computed as the average of the three items. Higher scores indicate higher confidence in food resource management ability.

To examine potential pre- to post- Cooking Matters program differences and their meaningfulness, composite scores were analyzed using a repeated measures analysis of variance (RMANOVA). Prior to conducting the tests, the data were checked for possible assumption violations and none were present. Exact *p*-values were reported, but statistical significance was set conservatively a priori at $p < .01$. All descriptive and statistical tests were compiled and conducted using SAS version 9.4.

RESULTS

Sample

A total of 969 participants responded to complete or partial Cooking Matters Surveys. Only individuals who responded to both a pre- and post- Cooking Matters program survey (n=526) were used for the remaining analyses. The completion rate for the surveys was 54%. Demographics from

the sample can be found in Table 2. The sample is primarily female (79.42%), age 60 and over (28.82%), and holds a high school diploma or GED (29.96%). The sample was predominantly Caucasian (51.33%), or African American (39.73%). Only a small percentage of the sample had WIC benefits (9.70%); a larger percentage had SNAP benefits (28.14%) and Medicaid (26.28%). Food pantry participation was present in 15.59% of the sample. On average, households contained 2.89 individuals, with less than one child on average living in the home (see Table 2).

Table 2. Demographics

Category	Frequency	Percent
age		
Under 18	18	3.48
18-29	94	18.18
30-39	93	17.99
40-49	82	15.86
50-59	81	15.67
60+	149	28.82
No response	9	
Educational Attainment		
Less than high school	52	10.12
High school diploma or GED	154	29.96
Some college	143	27.82
2-year degree (Associates)	46	8.95
4-year degree (Bachelor's)	119	23.15
No response	12	
Race*		
Caucasian	270	51.33%
Black	209	39.73%
Asian	5	0.95%
Pacific Islander	2	0.38%
American Indian	11	2.09%
Other	23	4.37%
Hispanic	17	3.33%
Other		
Pregnant	8	1.55%
WIC participation	51	9.70%
SNAP participation	148	28.14%
Free/Reduced School Breakfast	72	13.69%
Free/Reduced School Lunch	85	16.16%
Free/Reduced Summer Meals	15	2.85%
Head Start participation	17	3.23%
Food Pantry participation	82	15.59%

Note, Some respondents indicated more than one race; thus, percentages add to higher than 100%

Scale Scores

Average scale scores at each time point are found in Table 3. All scales had higher post-program mean scores except the Cooking Barriers Scale. Higher scores on the Cooking Barrier Scale represent higher perceived barriers to cooking at home and a reduction in the Cooking Barrier Scale represents a reduction in perceived cooking barriers for respondents. Higher scores on the Cooking Confidence Scale, for example, represent higher respondent confidence in their healthy cooking ability; an increase in CCS scores represents an increase in respondent confidence. The largest change was seen with the Cooking Confidence Scale (average increase of 0.46 points across all participants). Also included in Table 3 are Cohen's *d* effect sizes the change from pre- to post-program for each scale. The effect sizes ranges from 0.2648 (Cooking Barriers Scale), a small to medium effect size, to 0.5966 (Healthy Food Preparation Scale), a medium to large effect size[30]. The Dietary Patterns Scale and Food Resource Management Scale had lower than desirable reliability, according to common heuristics of Cronbach's alpha [31].

Table 3. Scale Score Averages

	Pre-Cooking Matters			Post-Cooking Matters			Cohen's d
Scale	**Mean**	**SD**	**Cronbach's alpha**	**Mean**	**SD**	**Cronbach's alpha**	
CBS	1.443	0.9937	0.8972	1.2079	0.9419	0.9069	0.2638
CCS	3.0257	0.9639	0.8756	3.4862	0.7416	0.9022	0.4872
CDCS	2.1683	0.9169	0.7774	2.494	0.8823	0.7969	0.4088
DPS	2.107	0.4401	0.5654	2.2471	0.3994	0.4976	0.3703
HFPS	2.4344	0.7641	0.8086	2.8184	0.6686	0.8089	0.5966
FRMS	2.5862	0.9646	0.6833	2.8796	0.8414	0.6584	0.3434

Correlations among the scales were positive (see Table 4) except for negative correlations among Cooking Barriers Scale and other scales. Positive correlations indicate that higher scores on one scale are associated with higher scores on the other scale, whereas negative correlations indicate higher scores on one scale are associated with lower scores on the other scale. For the pre- Cooking Matters program scales, the largest correlation in magnitude was between HFPS and FRMS (r=.6184, p<.0001). For the post-Cooking Matters program scales, the largest correlation in magnitude was also between HFPS and FRMS (r=.6507, p<.0001).

Table 4. Correlations Pre- Cooking Matters Intervention Scales

	CBS	**CCS**	**CDCS**	**DPS**	**HFPS**	**FRMS**
CBS	1	-0.26865*	-0.12288*	-0.22345*	-0.27153*	-0.25146*
CCS	-0.33345*	1	0.29601*	0.27148*	0.54897*	0.38917*
CDCS	-0.12545*	0.2771*	1	0.49253*	0.60261*	0.40549*
DPS	-0.1647*	0.26094*	0.54895*	1	0.53892*	0.31935*
HFPS	-0.29076*	0.55522*	0.56195*	0.55677*	1	0.65066*
FRMS	-0.16045*	0.36649*	0.36131*	0.34554*	0.6184*	1

Note, * indicated statistical significance (alpha=.01). Pre-Cooking Matters correlations are found below the diagonal and post-Cooking Matters correlations are found above the diagonal.

Repeated Measures Models

Repeated measures analysis of variance models were used to examine differences in change over time in the six scale scores variables and the differential changes for various independent variables. The interaction between time and the predictor is of particular interest (see Table 5). Significant interactions (denoted with an **) indicate that those independent variables had differential growth from pre- to post- Cooking Matters program. Only those scales for which there were differential changes for some groups (CBS, CCS, DPS, and HFPS) are presented. For the CDCS and FRMS, there were no differential changes in scale scores for any subgroups, indicating that any growth was either insignificant or consistent for all groups.

Table 5. Results from RMANOVA

Source	**Cooking Barriers**	**Cooking Confidence**	**Dietary Patterns**	**Healthy Food Preparation**
SNAP	1.38 (0.2408)	1.93 (0.1657)	6.11 (0.0138**)	3.69 (0.0553)
race	1.56 (0.199)	3.23 (0.0222**)	4.69 (0.0031**)	0.99 (0.3975)
edu	0.32 (0.8673)	7.39 (<.0001**)	3.8 (0.0047**)	14.09 (<.0001**)
child05	1.72 (0.1444)	2.94 (0.0202**)	1.51 (0.1983)	1.2 (0.3111)
hgrp	0.13 (0.9422)	0.95 (0.4161)	2.09 (0.1002)	1.57 (0.1951)
Food Pantry	5.06 (0.0250**)	0.01 (0.9317)	1.47 (0.2255)	3.45 (0.0637)
Time	1.91 (0.1672)	0.76 (0.3851)	5.14 (0.0238**)	1.55 (0.2141)
Time*SNAP	4.87 (0.0278**)	1.37 (0.242)	0.18 (0.6684)	0.32 (0.5724)
Time*race	0.17 (0.9147)	0.94 (0.4203)	0.24 (0.871)	0.25 (0.8629)
Time*edu	1.51 (0.1976)	2.1 (0.0801)	2.68 (0.0312**)	4.05 (0.0031**)
Time*child05	0.12 (0.9747)	2.66 (0.0322**)	0.55 (0.7007)	2.42 (0.0475**)
Time*hgrp	0.9 (0.4409)	1.98 (0.116)	0.93 (0.4237)	0.46 (0.7125)
Time*FoodPantry	1.82 (0.178)	1.69 (0.1937)	0.2 (0.6587)	0.83 (0.3619)

Note, Each column contains the F test statistic for the fixed effect. The significance value is provided in parentheses. Asterisks indicate statistical significance at the .05 level.

Cooking Barriers Scale

For the Cooking Barriers Scale, differential changes for pre- to post- Cooking Matters program were found for SNAP participation ($F(1, 492)=4.87$, $p=.0278$). The significant SNAP by time interaction indicates that SNAP recipients and non-recipients changed in different ways from pre- to post- Cooking Matters in their perception of cooking barriers. Specifically, follow-up tests (Table 6) illustrates that SNAP non-participants had an average decrease in Cooking Barriers Scale Scores of 0.41 points. SNAP participants had an average decrease in the Cooking Barriers Scale Scores of 0.20 points. While both groups, SNAP participants and non-participants, had similar post-program scores (1.093 for non-participants and 1.088 for participants), their pre-program average scores were different (1.501 for non-participants and 1.284 for participants). Thus, SNAP non-participants had higher initial barriers to cooking, but post-program, both participants and non-participants had similar average barriers to cooking.

Table 6. SNAP Follow-ups, Cooking Barriers

SNAP	Pre-CM	Post-CM	Change (Post-Pre)
Non-participant	1.5006	1.0930	-0.4076
SNAP participant	1.2845	1.0885	-0.1960

Cooking Confidence Scale

Growth in average perceived cooking confidence was differentially impacted by the number of children under the age of five ($F(4, 492)=2.66$, $p=.0322$). The significant interaction between children under five and time indicates that households changed in different ways, depending on the number of young children, from pre- to post- Cooking Matters in their perception of Cooking Confidence. Specifically, follow-ups (Table 7) indicate that households with three children under the age of 5 had decreases in cooking confidence, but other households had increases in cooking confidence. Notably, the households with three children under the age of five were all in the 18-29 years old age group, in large households (7-10 total individuals), were both WIC and SNAP participants, make use of a food pantry, and showed more unhealthy dietary patterns pre-program.

Table 7. Follow-ups, Cooking Confidence

Children Under 5	Pre-CM	Post-CM	Change (Post-Pre)
0	3.00287	3.47477	0.47190
1	3.18137	3.58824	0.40686
2	2.69737	3.22368	0.52632
3	4.00000	3.31250	-0.68750
5	3.58333	3.83333	0.25000

Dietary Patterns Scale

Differential changes for pre- to post- Cooking Matters program were found for educational attainment level ($F(4, 492)=2.68$, $p=.0312$). The significant interaction of time and educational attainment indicates that education levels showed differential changes in dietary patterns from pre- to post- Cooking Matters. Specifically, follow-ups (Table 8) illustrate that individuals with lower educational attainment showed the largest growth in dietary patterns, while those individuals with the highest educational attainment showed the lowest growth in dietary patterns.

Table 8. Follow-up, Dietary Patterns

Educational Attainment	Pre-CM	Post-CM	Change (Post-Pre)
Less than high school	2.00385	2.24231	0.23846
High school diploma or GED	2.01364	2.17727	0.16364
Some college	2.08671	2.24755	0.16084
2-year degree (Associates)	2.1587	2.26739	0.1087
4-year degree (Bachelor's)	2.26555	2.32101	0.05546

Healthy Food Preparation Scale

Differential changes of the Healthy Food Preparation Scale for pre- to post- Cooking Matters program were found for educational attainment level ($F(4,492)=4.05$, $p=.0031$) and household children under five ($F(4,492)=2.42$, $p=.0475$). For the Healthy Food Preparation Scale, education levels showed differential changes in healthy food preparation from pre- to post- Cooking Matters. Specifically, the follow-ups in Table 9 illustrate that most educational groups showed similar changes in healthy food preparation; those individuals with the highest educational attainment showed the smallest change in healthy food preparation.

Table 9. Follow-up, Healthy Food Preparation, Educational Attainment

Educational Attainment	Pre-CM	Post-CM	Change (Post-Pre)
Less than high school	2.25	2.64183	0.39183
High school diploma or GED	2.13312	2.63312	0.5
Some college	2.41434	2.8042	0.38986
2-year degree (Associates)	2.58696	3.0163	0.42935
4-year degree (Bachelor's)	2.82983	3.04517	0.21534

For the Healthy Food Preparation Scale, the children under five by time interaction (child05*edu) is statistically significant. This indicates that different numbers of children under five showed differential changes in healthy food preparation from pre- to post- Cooking Matters. Specifically, Table 10 shows that households with no, one, and two young children had similar changes in health food preparation. Households with three young children had a decrease in healthy food preparation patterns.

Table 10. Follow-up, Healthy Food Preparation, Children Under 5

Children Under 5	Pre-CM	Post-CM	Change (Post-Pre)
0	2.42317	2.80963	0.38647
1	2.44853	2.89461	0.44608
2	2.28289	2.70395	0.42105
3	2.90625	2.4375	-0.46875
5	2.875	2.95833	0.08333

DISCUSSION

The Cooking Barrier Scale, Cooking Confidence Scale, Dietary Patterns Scale, and Healthy Food Preparation Scale all exhibited differential changes for some subgroups of individuals from pre- to post- Cooking Matters program. These differential changes from before to after the Cooking Matters program indicates that for some subgroups, Cooking Matters has varying success. There may still be other factors beyond educational programs, such as Cooking Matters, that hinders growth in these areas. The primary strength of this study is that participant characteristics were included in the linear model to explain scale changes from pre- to post- Cooking Matters programming. No other study, to our knowledge, utilizing the Cooking Matters national impact evaluation included participant characteristics in the linear model.

For the CBS, SNAP participants had lower perceived cooking barriers pre-Cooking Matters program, but both SNAP participants and non-participants had similar perceived cooking barriers post- Cooking Matters program. The reason for this could be due to Supplemental Nutrition Assistance Program Education (SNAP-Ed), a grant program that funds projects across the U.S.[25] The goal of SNAP-Ed is to "improve the likelihood that persons eligible for SNAP will make healthy food and lifestyle choices that prevent obesity." SNAP-Ed in Arkansas is a partnership between the University of Arkansas Cooperative Extension Service, the Arkansas Department of Human Services, and the USDA Food and Nutrition Service. SNAP-Ed in Arkansas reaches approximately 68.7% of SNAP recipients in the state. Thus, SNAP participants in the sample may have had SNAP-Ed assistance, lowering their cooking barriers before enrolling in CM. In that case, Cooking Matters can be seen as effective for both SNAP participants and non-participants, allowing non-participants to lower their cooking barriers to levels similar to SNAP participants who may have experienced other SNAP-Ed programs. This may help explain why there was not differential growth among SNAP and non-SNAP recipients for other scales.

Education attainment exhibited differential changes from pre- to post-program for the Dietary Patterns Scale and the Healthy Food Preparation Scale. In both cases, individuals with the highest levels of educational attainment had the lowest growth in average scale scores. Growth tended to decrease as educational attainment increased. For the Dietary Patterns scale, those with the lowest educational attainment had lower scores, on average prior to the Cooking Matters program. McKay[32] suggests this may be because better-education individuals receive better nutrition information. Thus, Cooking Matters is an effective means to close the gap in nutrition information quality across education levels, resulting in improved dietary patterns. A similar pattern holds for the Healthy Food Preparation Scale, although those with higher educational levels tend to have higher scores post- Cooking Matters for the HFPS.

The number of children in a household exhibited differential changes from pre- to post-program for the Cooking Confidence Scale and the Healthy Food Preparation Scale. In both cases, individuals with the zero, one, or two children under five had similar levels of growth for both scales. Households with three children under age five showed a decrease in the scale from pre- to post-program. While the sample size is small, Table 11 presents a description of these individuals. All were on WIC and SNAP, had large families (7-10 total individuals) and none had 4-year college degrees.

Table 11.

Educational Attainment	Race	Total Household Size	Children Age 6-17	WIC and SNAP	Free/Reduced School Meals	Food Pantry
High school diploma or GED	Caucasian	10	0	Yes	No	Yes
2-year degree (Associates)	Black	7	2	Yes	Yes	Yes
Some college	Black	7	2	Yes	Yes	Yes
High school diploma or GED	Black	7	2	Yes	Yes	Yes

One limitation of this study is that no comparison group of Cooking Matters non-participants was available. Another limitation is the poor reliability of the DPS and FRMS scales. Pinard and colleagues [28] found higher scale reliability, in general, for a convenience sample in Nebraska. Reliability is dependent on survey characteristics and administration, as well as the group of respondents[29]. Conclusions regarding these scales should be made with caution. Essentially, higher reliability values stem from shared covariance among the items, which implies the items are measuring the same underlying construct. Low values of reliability imply the opposite: little shared covariance and the items may not be measuring the same underlying construct. That is, a measure such as the mean of the scale may not be a useful representation of the construct. One method to increase the reliability is to increase the scale lengths. The Spearman Brown prophesy formula indicated that the scale lengths will need to be doubled to increase reliability to acceptable levels. We chose to conduct our analyses on the scales, rather than each item separately, because the EFA showed distinct scales. The last limitation is that this study only focuses in on Arkansas. A previous study [27] focused on food resource management of Cooking Matters in California, Colorado, Maine, Massachusetts, and Oregon. Future studies should consider examining the impact of Cooking Matters in other states and regions in the United States.

This study has provided additional evidence that Cooking Matters is an effective program. It is the only study that extends previous work to the southern state of Arkansas, a state with higher rates of food insecurity than those used in previous research. Also, this is the only study that examines the impact of the Cooking Matters program as whole in states located outside of the national impact evaluation. Comparing the findings in this study to those from previous, although limited, research on Cooking Matters' effectiveness reveals a few notable differences. Pinard and colleagues[33] found higher scale reliability, in general, for a convenience sample in Nebraska. In addition, their sample showed higher average CBS, HFPS, and CCS scores, for both pre- and post- Cooking Matters. Similarly, Pooler's study[13] showed FRMS scores of almost 1.5 points higher pre- Cooking Matters than in this study and almost 1 point higher post- Cooking Matters. This indicates that the Arkansas sample began with considerably lower perceived food resource management skills than other studies. Even though the scales showed growth, other than the Cooking Barriers Scale, Arkansas participants do not catch up to participants in other states. Thus, more and consistent nutrition educational programming is required in order to alleviate the rates of food insecurity in the state. For southern states with high rates of food insecurity, the impact of Cooking Matters needs further exploration.

ACKNOWLEDGMENTS

No financial support was received for this project. We would like to thank the Arkansas Hunger Relief Alliance and The No Kid Hungry Share Our Strength Cooking Matters Program for providing access to the dataset.

Notes:

Review by the institutional review board was not required for this study because human subjects were not involved, as per US Department of Health and Human Services guidelines (http://www.hhs.gov/ohrp/policy/checklists/decisioncharts.html#c1)."

REFERENCES

1. Anderson SA. Core indicators of nutritional state for difficult-to-sample populations. *The Journal of Nutrition*. 1990; 120(11): 1557-1599.
2. Feeding America. Map the Meal Gap 2016. Available online at http://map.feedingamerica.org/. Accessed March 15, 2019.
3. Aber N. Hunger in Arkansas Press Release. Hunger Free America. https://www.hungerfreeamerica.org/sites/default/files/atoms/files/Hunger%20in%20Arkansas%20Press%20Release%202018.pdf. Published December 5, 2018. Accessed April 9, 2019.
4. Wiig K, Smith C. The art of grocery shopping on a food stamp budget: factors influencing the food choices of low-income women as they try to make ends meet. Public Health Nutr. 2008;12:1726-1734.
5. Martin KS, Colantonio AG, Picho K, Boyle KE. Self-efficacy is associated with increased food security in novel food pantry program. SSM Popul Heal. 2016; 2: 62-67.

6. Brite-Lane A, Phelps J, Fuller S, Crook T, Hakkak R. Evaluating effectiveness of the Arkansas Expanded Food and Nutrition Education Program on changing food resource management and nutrition practice outcomes. FASEB J. 2015;29(1 suppl). http://www.fasebj.org/content/29/1_Supplement/911.7.abstract.
7. Auld G, Baker S, Conway L, Dollahite J, Lambea MC, McGirr K. Outcome effectiveness of the widely adopted EFNEP curriculum Eating Smart, Being Active. J Nutr Educ Behav. 2015;47:19-27.
8. Mabli, J., Ohls, J., Dragoset, L., Castner, L., and Santos, B. (2013). Measuring the Effect of Supplemental Nutrition Assistance Program (SNAP) Participation on Food Security. Prepared by Mathematica Policy Research for the U.S. Department of Agriculture, Food and Nutrition Service, August 2013. https://fns-prod.azureedge.net/sites/default/files/Measuring2013.pdf. Accessed March 15, 2019.
9. Schanzenbach D, Bauer L, & Nantz G. Twelve facts about food insecurity and SNAP. Prepared by The Hamilton Project.http://www.hamiltonproject.org/assets/files/twelve_facts_about_food_insecurity_and_snap.pdf. Published April 2016. Accessed April 10 2019.
10. Share Our Strength, Cooking Matters ® Course Impact Evaluation: Final Report by Loren Bell, Ruth Morgan, Jennifer Pooler, Margaret Wilkin. Project Officer: Karen Wong. Washington, DC: March 2016.
11. Arkansas Hunger Relief Alliance. History and mission. http://www.arhungeralliance.org/about/history-mission/ . Published 2016. Accessed June 30, 2016.
12. Altarum Institute. Cooking matters course impact evaluation: executive summary. Unpublished manuscript. 2016.
13. Pooler J, Morgan R, Wong K, Wilkin M, Blitstein J. Cooking matters for adults improves food resource management skills and self-confidence among low-income participants. *Journal of Nutrition Education and Behavior*. 2017; 49: 545–553.
14. The State of Obesity. Adult obesity in the United States. https://www.stateofobesity.org/adult-obesity/. Published September 2018. Accessed April 9, 2019.
15. Centers for Disease Control and Prevention. New CDC report: more than 100 million Americans have diabetes or prediabetes. https://www.cdc.gov/media/releases/2017/p0718-diabetes-report.html. Published July 18, 2017. Accessed April 9, 2019.
16. American Diabetes Association. The burden of diabetes in Arkansas. http://main.diabetes.org/dorg/PDFs/Advocacy/burden-of-diabetes/arkansas.pdf. Published n.d. Accessed April 9, 2019.
17. Smith LP, Ng SW, Popkin BM. Trends in US home food preparation and consumption: analysis of national nutrition surveys and time use studies from 1965-1966 to 2007-2008. *Nutrition Journal*. 2013;12(45).
18. Allen AJ, Kuczmarski MF, Evans MK, Zonderman AB, Waldstein SR. Race differences in diet quality of urban food insecure blacks and whites reveals resiliency in blacks. *J Racial Ethn Health Disparities*. 2016;3(4):706-712.
19. Zoellner J, Connell C, Bounds W, Crook L, Yadrick K. Peer reviewed: nutrition literacy status and preferred nutrition communication channels among adults in the lower Mississippi Delta. *Preventing Chronic Disease*. 2009; 6(4).
20. Spiteri Cornish L, Moraes C. The impact of consumer confusion on nutrition literacy and subsequent dietary behavior. *Psychology & Marketing*. 2015; 32(5): 558-574.
21. Acheampong I, Haldeman L. Are nutrition knowledge, attitudes, and beliefs associated with obesity among low-income Hispanic and African American women caretakers?. *Journal of Obesity*.2013.
22. Wagner K. Revealing the truth about nutrition labelling: The age of the confused consumer. *Studies by Undergraduate Researchers at Guelph*. 2014; 7(3): 42-46.
23. Bower KM, Thorpe RJ, Rohde C, Gaskin DJ. The intersection of neighborhood racial segregation, poverty, and urbanicity and its impact on food store availability in the United States. *Preventive Medicine*. 2014; 58: 33-39.
24. Darko J, Eggett DL, Richards R. Shopping behaviors of low-income families during a 1-month period of time. *Journal of Nutrition Education and Behavior*. 2013; 45(1): 20-29.
25. Lin BH, Ver Ploeg M, Kasteridis P, Yen ST. The roles of food prices and food access in determining food purchases of low-income households. *Journal of Policy Modeling*. 2014; 36(5): 938-952.
26. Hiza HA, Casavale KO, Guenther PM, Davis CA. Diet quality of Americans differs by age, sex, race/ethnicity, income, and education level. *Journal of the Academy of Nutrition and Dietetics*. 2013; 113(2): 297-306.
27. Pooler JA, Morgan RE, Wong K, Wilkin MK, Blitstein JL.Cooking matters for adults improves food resource management skills and self-confidence among low-income participants. *Journal*

of Nutrition Education and Behavior. 2017; *49*(7): 545-553.

28. Pinard C, Uvena L, Quam J, Smith T, & Yaroch A. Development and testing of a revised cooking matters for adults survey. *American Journal of Health Behavior.*2015; 39: 866-873.
29. Traub, R., & Rowley, G. (1991). An NCME instructional module on understanding reliability. *Educational Measurement: Issues and Practice, 10,* 37-45.
30. Cohen, Jacob (1988). *Statistical Power Analysis for the Behavioral Sciences*. Routledge: Mahwah, New Jersey.
31. Nunnally J C *Psychometric Theory.* (2nd ed.). New York, NY: McGraw-Hill. 1978.
32. U.S. Department of Agriculture. SNAP-Ed Connection. U.S. Department of Agriculture. https://snaped.fns.usda.gov/about. No Publication Date. Accessed April 10 2019.
33. McKay D, Houser R, Blumberg J, & Goldberg J. Nutrition information sources vary with education level in a population of older adults. *Journal of the American Dietetic Association.*2016; 106(7): 1108-1111.