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I, Francesca Urbina, hereby submit this original work as part of the requirements for the degree of Master of Science in Nutrition.

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A Formative Evaluation of Moms in the Kitchen: A Program to Increase Food Literacy in Low-Income Women

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A Formative Evaluation of Moms in the Kitchen: A Program to Increase Food Literacy in Low-Income Women

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the degree of Master of Science

Department of Nutritional Sciences
College of Allied Health Sciences

by

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Abstract

A Formative Evaluation of *Moms in the Kitchen*:

A Program to Increase Food Literacy in Low-Income Women

Relevance: Food literacy has been conceptualized to include 4 domains: planning and managing, selecting, preparing, and eating; all of which have been associated with diet-related chronic diseases in low-income women. In partnership with community dietitians, we developed a 6-week experiential program, *Moms in the Kitchen*, based on Social Cognitive Theory, with the objective of improving food literacy.

Methods: We completed a formative evaluation of *Moms in the Kitchen*. The sample consisted of the 1st cohort of 5 African-American women. Semi-structured, in-depth interviews (~90 minutes) were completed the week after the program ended. Interview questions were selected from published process evaluations. Interview questions addressed recruitment, attendance, class format and content, knowledge and skills learned, and suggestions for improvement. Notes from the interviews were coded and emerging themes were identified. Weekly prepared recipes were evaluated on appearance, taste, texture, smell, and overall using a 6-point scale. These data were analyzed using SPSS (v23).

Results: Mean attendance was 4.8/6 classes. Recipes received an average overall rating of 5.6/6. Qualitative interviews yielded 5 major categories: general feedback, facilitators to initial attendance, facilitators to continued attendance, barriers to attendance, and program satisfaction and suggestions.

Conclusions: *Moms in the Kitchen* was well received by participants and has the potential to increase food literacy in low-income women. Additional lessons learned can aid other food and nutrition professionals with development of a similar program.

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Introduction

Low-income mothers face significant health challenges related to low food literacy and associated high rates of obesity and chronic disease. Over 45% of women in the United States are at risk for chronic diseases such as cardiovascular disease, type 2 diabetes, and other health conditions complicated by overweight and obesity. Low-income women are disproportionately represented in this group and are thus at higher risk for such diseases.¹ Overweight and obesity are of particular concern in women of reproductive age. Women entering pregnancy are more likely to exceed recommendations for gestational weight gain, posing risk to both mother and child, and contributing to the overall problem of obesity in the U.S.² Women with pregravid overweight or obesity are more likely to develop diabetes and hypertension, and predispose their children to obesity, diabetes, and cardiovascular disease later in life. Pregravid obesity also poses a risk for infant mortality.³

Food literacy has been identified as an area of nutrition research and education that could address the nutrition related chronic diseases low-income women face. Though there is not one fixed definition of food literacy, it can be defined in general as a combination of knowledge, skills, behaviors, and self-efficacy that are required to orchestrate a high-quality diet within the resources and means available.

Current research suggests that increasing the monthly food budget of low-income women alone may not directly lead to an increase in dietary quality. The observed poor diet quality of low-income women is related, at least in part, to an erosion of food literacy skills. This deterioration of food literacy has led to a nationwide reliance on prepacked foods, or foods from outside the home, which are often high in fat, sodium, and calories.⁴ In 2007, low-income families consumed a third of their daily calories from sources outside the home.⁵ Many of these unhealthy foods appear inexpensive on the surface, a factor that may contribute to their high consumption rates as compared to higher priced, healthier options.

The dietary quality of most Americans, including low-income women, needs improvement. Using National Health and Nutrition Examination Survey (NHANES 2011-2012) data, Economic Research

Services evaluated participants' diets using the Health Eating Index (HEI). The HEI is a measure of dietary quality, scored between 0-100 with a score of 100 indicating 100% adherence to the Dietary Guidelines for Americans.⁶ Low-income respondents scored an average of 48.1 points. HEI scores were not significantly different across income levels, suggesting that food cost is not the only mitigating factor to consumer food purchase.⁷

Despite the need for improved dietary quality, and identified deteriorating food literacy skills in the American population, there is a deficit of theory based food literacy interventions and even fewer resources to aid in the development of such a program. This may be in part due to conflicting definitions and a lack of consensus on the components that comprise food literacy.⁸ To date, no existing interventions have holistically addressed increasing self-efficacy, behavior, or knowledge related to food literacy in low-income women. Interventions have been done to address singular aspects of food literacy in a variety of populations. The success of such programs is limited, as they are fragmentary in nature and do not attempted to comprehensively cover all aspects of food literacy in their design. This limited success is seen in the continued poor diet quality of low-income women.

Current literature suggests an erosion in food literacy has played a major role in the observed downward trend of diet quality and upward tick of non-communicable disease seen in the United States. These lifestyle-related diseases disproportionately affect low-income women.⁹ *Moms in the Kitchen* is a community-based, interactive, experiential program aimed at increasing food literacy in low-income women as a method to increase dietary quality in this population. The present study aims to describe the development and formative evaluation of *Moms in the Kitchen*, a food literacy program.

Literature Review

Income and Diet Quality

The Supplemental Nutrition Assistance Program (SNAP) is the largest national food assistance program, helping to reduce food insecurity over 45 million individuals.¹⁰ SNAP provides a monthly

allocation for food purchases to low-income families based on their monthly income and household size. However, this increase in food budget has not translated into healthier grocery purchases. Compared to eligible nonusers, SNAP users scored significantly lower scores for total HEI, vegetables, and fruit sub-categories and significantly higher on percent of daily calories from “empty” calories and added sugar sub-categories.¹¹ Adult SNAP users have been shown to have poorer diet quality than their nonparticipant and higher-income counterparts.¹² While SNAP does address food insecurity in low-income populations, it has not yet met its goal of improving the overall diet quality of its participants.¹¹⁻¹³ The observed paradoxical trend of food insecurity and obesity furthers the argument that food cost is not the only mitigating factor related to diet quality, highlighting the need for nutrition education interventions in low-income populations.¹⁴

The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) provides a monthly allotment for foods for low-income women who are pregnant, lactating, or who have a child under the age of 5 years. Unlike SNAP, WIC provides supplemental food benefits in these categories: protein (peanut butter, beans, legumes, tofu), low-fat dairy, whole grains, fruits, and vegetables.¹⁵ WIC food packages were revised to better align the allowed WIC foods with current Dietary Guidelines for Americans and Dietary Reference Intakes, as recommended by the USDA and a special committee the Institute of Medicine (IOM) assembled to evaluate the WIC program. A systematic review showed changes in WIC packages resulted in an overall increase in diet quality, and increased availability of healthier food and beverage products in WIC authorized retailers.¹⁶ This overall positive trend was also observed in ethnic populations of WIC participants in some states.^{16,17} These changes are promising.

Income and race are just two of many factors that impact diet quality and longer-term health outcomes of women. Diet quality in adults, as measured by the Healthy Eating Index, trends upward with an increase in age, socioeconomic status, and education.¹⁸ While most Americans consume excess amounts of sugar and solid fats, minorities consume significantly more sugar, with African Americans consuming the most, followed by non-black Hispanics, and non-Hispanic whites.^{18,19} Higher-income

Americans consume twice as many servings of fruits and vegetables versus low-income individuals. While 42% of white Americans meet recommendations for servings of dairy, only 35% of Hispanics and 15% of African Americans meet current guidelines.²⁰ Income, education, and ethnicity certainly play a role in creating the gap in diet quality and following health outcomes observed between groups. Several factors, including geographic and monetary access to healthy foods and the nutritional knowledge required to develop behaviors and skills must be addressed in the fight to close this health gap.

Food Literacy

Food literacy is an emerging concept related to health literacy. Nutbeam first described health literacy as “the cognitive and social skills which determine the motivation and ability of individuals to gain access to, understand and use information in ways which promote good health.”²¹ More than literacy and numeracy, health literacy links knowledge, motivation, competence, access, and empowerment to individuals’ and communities’ ability to maintain or improve health.

As an emerging concept, an agreed upon definition of food literacy has not been established. One way food literacy has been described is as an expansion of the health literacy model, containing functional, critical, and interactive nutrition literacy components.²² Individuals must obtain factual information or knowledge, analyze such information, and develop complex skills and motivation to complete tasks, all while applying this within the context of social, cultural, and environmental factors.²³ Food literacy has also been defined as “the ability of an individual to understand food in a way that they develop a positive relationship with it, including food skills and practices across the lifespan in order to navigate, engage, and participate within a complex food system...to make decisions to support the achievement of personal health and a sustainable food system considering environmental, social, economic, cultural, and political components.”²⁴ In this definition, health professionals are called to use food literacy as a framework for action, to integrate the concepts of food security and food skills as a means of addressing community health issues. In summary, the aforementioned definitions describe managing the logistics and practicalities of obtaining food and nutrition. Though both definitions

highlight a need for food related skills and knowledge, and acknowledge the social and environmental context in which individuals make food decisions, both definitions lack the detail and concrete nature to which nutrition interventions can be applied.

The most comprehensive definition of food literacy was conceptualized by Vidgen and Gallegos, who's definition is derived from primary research in low-income populations and with health promotion and nutrition experts. Their method aimed to define food literacy from two points of view: that of food experts, who "aimed to reflect the intention of existing policy and investment," and that of individuals, who provided insight and context into the day-to-day "practicalities of food provisioning and consumption."²⁵

Vidgen and Gallego's method can be divided into two separated studies: the Expert Study, and the Young People's study. First, a definition of food literacy and its components was derived from 3 rounds of interviews with a group of international nutrition and health promotion experts, each followed by analysis. This "expert definition" was reviewed through a comparison with other food literacy interventions and peer debriefings to test face validity. Concurrently, semi-structured, life course interviews with low-income young people in Canada were conducted. These data were twice analyzed, and results were summarized as the "young-person's definition." Results from both sets of interviews were combined and analyzed, deriving a comprehensive food literacy definition. This definition was finalized through another peer debriefing session, yielding a final definition of food literacy and its 11 components.

Vidgen and Gallegos define food literacy as "the scaffolding that empowers individuals, households, communities or nations to protect diet quality through change and strengthen dietary resilience over time. It is composed of a collection of inter-related knowledge, skills and behaviors required to plan, manage, select, prepare and eat food to meet needs and determine intake."²⁵

The planning and managing domain describes the knowledge, skills, behaviors, and thought processes required to make decisions and plan food intake. The selecting domain describes accessing and selecting foods based on the quality of a food product. The preparing domain describes using basic food safety and cooking techniques to prepare a good tasting meal from available resources. Lastly, the eat domain highlights the physical and social impact of food. Vidgen and Gallegos definition describes in depth the knowledge, skills, behavior, and empowerment necessary for an individual to be resilient in protecting diet quality amongst a dynamic food environment. This definition encompasses “the tools needed for a healthy relationship with food,” the dynamic nature of the four domains of food literacy, and specific components and abilities that can be measured by a food literacy based intervention (Figure 1). Their definition served as the guiding framework for our food literacy intervention.

Figure 1. Components of food literacy

Image credit: Helen Anna Vidgen, Danielle Gallegos, Defining food literacy and its components,

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<http://dx.doi.org/10.1016/j.appet.2014.01.010>.

Planning & Managing Domain

Vidgen and Gallegos describe the planning and managing domain as “making time for food and eating, having a plan to ensure this happens, and having the skills to construct a feasible plan that is capable of delivering an expected outcome.”²⁵ The 3 components of the planning and managing domain include “prioritizing money and time for food, planning food intake...so that food can be regularly accessed...irrespective of changes in circumstances or environment, and making feasible food decisions.”²⁵

In a nationally representative study, women were found to be approximately 7 times more likely than men to plan food intake for the household, with 40% of women reporting main responsibility for meal planning (compared to only 6% of men reporting main responsibility), and 60% of women reporting sharing the responsibility with a partner. Income was not found to be a significant predictor of gender roles in meal planning, suggesting that across income levels, US women are more likely to hold the main responsibility of meal planning for the household.²⁶ Additionally, lower levels of self-efficacy may be sufficient in enabling women to implement food planning strategies as compared to men with equally low levels of self-efficacy.²⁷ These results suggest that an intervention in low-income women aimed at increasing food literacy in the planning and managing domain has the potential to be effective, with effects reaching beyond that of the individual and into the household.

Interventions aimed at increasing self-efficacy, knowledge, and behaviors in low-income women related to the planning and managing domain of food literacy have been shown to be successful in improving participant diet quality (at least in the short-term), though few address all components of planning and managing food intake. An online nutrition education program in low-income women was found to increase use of a grocery budget when shopping for food, and increase confidence in managing money to make healthy foods available ($p = .008$, $p = .001$, respectively).²⁸ A nutrition education program encouraging a healthy food environment through goal setting found that participants who reported higher goal attainment reported greater self-efficacy for planning fruit and vegetable consumption and menu

planning skills ($p = 0.05$).²⁹ In a quasi-experimental study, low and high income women were tasked with building a grocery list on their usual budget, an augmented budget, and a restricted budget. When low and high-income women's budgets were "equalized," low-income women still chose a greater proportion of foods from the less healthy category, and a smaller proportion of foods from the healthy category, as compared to high income women ($p < 0.05$). This suggests that budget may not be the only factor related food planning, selecting, and purchasing strategies of healthy foods in low-income women, and the observed food insecurity-obesity paradox.^{30,31} The scope of conclusions that can be drawn from the existing literature is limited, as they are few in volume and often do not specifically target planning and managing, nor food literacy as a whole. Existing literature highlights the need to prioritize money and time for food, the importance and benefits of planning food intake, but have not addressed other factors related to planning and managing food, including balancing food needs (nutrition, taste, hunger) with available resources (skills, equipment, money, time) in a holistic manner.²⁵

Selecting Domain

Vidgen and Gallegos describe the selecting domain as the "selection of grocery items... and food service items." The 3 components of the selecting domain address "accessing food through multiple sources and knowing the advantages and disadvantages, determining what is in a food product, and judging the quality of food."²⁵

Several factors have been identified to influence food choices in low-income women, including cost, taste, nutrition, household dynamic, emotional factors, logistics, convenience, and required cooking skills. Cost and budget considerations ranked highest among factors considered when selecting among food options, especially produce.³²⁻³⁶ Price was particularly important for overweight and obese women versus their leaner counterparts.³³ Taste and food preferences of family members was also an important factor considered during food selection.^{33,34} These preferences were often balanced against nutritional considerations. Obese and low-income women were more likely to select foods based on taste preference, despite some knowledge of a healthier alternative.³²⁻³⁴ Though cost was always cited as a greater barrier

to purchasing healthy foods, lean women were more likely to consider the nutritional value of a food when selecting food for purchase.³³ However, nutritional consideration in some cases reduced the likelihood that a low-income woman might purchase a food, despite the perceived connection between food and health.^{34,36}

The social dynamic of food played a role in low-income women's food choices outside food taste and preferences. Women perceived themselves as having the primary responsibility for "domestic food work," and preferred to do this independently (without assistance from a partner), despite their busy lives. Women reported a sense of pride about being the primary food procurer of the household.³⁴ House food rules played a role in the selection of food, though the type of rules and strictness of such rules varied among low-income households. Additionally, low-income women reported that social habits around food, such as eating dinner together as a family, influenced their food purchase decisions.^{32,34} The emotional component of food also directed food selection habits, particularly in obese women, who were more likely to report emotional eating as a coping mechanism for stress.³³

Geographic and logistical factors also played a role in the process of selecting foods. Low-income women reported their perception of a store's cleanliness or freshness of food available influenced where they may procure food. These factors might send them outside of their neighborhoods, despite also reporting transportation as a barrier to grocery shopping.³⁵

Lastly, the perceived convenience of a food and the cooking skills required to prepare a food were reported as important factors considering during food purchase. Low-income women had varying perceptions about what foods or food packaging formats were convenient (for example, fresh versus frozen versus canned vegetables).³⁵ Additionally, the level of cooking skills and time required to prepare a food was considered important. Low-income women perceived healthier foods as requiring more prep time than perceived unhealthy foods. An increase in cooking confidence and skills following an afterschool intervention for mother and child dyads mitigated this barrier to preparing healthy foods.^{32,34}

Preparing Domain

Vidgen and Gallegos describe the prepare domain as the basic level of “ability to prepare foods.” The 2 components of the prepare domain address “making a good tasting meal from whatever food is available, and applying basic principles of safe food hygiene and handling.”²⁵

Identified predictors of cooking skills in women include educational attainment, the number of people and children in a household, and enjoyment of cooking.³⁷ Women have also reported time as an important factor related to cooking and food preparation. A willingness to spend time cooking, and overall enjoyment of cooking has been shown to be a predictor of cooking skills. However, perceived time pressure is inversely related to cooking self-efficacy; this may lead women to choose convenience type foods.³⁸ Health consciousness and perceived healthiness of a prepared meal have also been identified as predictors of cooking skills, cooking self-efficacy, and a decreased propensity towards convenience and ready-made foods.^{37,38} High levels of cooking self-efficacy and skills, and increased frequency of applying such skills have been shown to impact diet quality and be related to food security, with higher levels being related to increase fruit and vegetable, grain, and protein consumption, and a decrease in convenience foods and sugar-sweetened beverages.³⁷⁻⁴⁰

Interactive cooking interventions of varying formats and lengths have also been shown to increase knowledge, behavior, skill, and self-efficacy related to cooking and food preparation. Low-income women who attended a short term (3 class), community nutrition education seminar showed an increase in overall knowledge scores (including an understanding of sodium in processed foods, spices as a way to reduce sodium, benefits of fruit and vegetables, nutrient versus calorie dense foods, and benefits of physical activity). Women also showed an increase in overall behavior scores, before and after the intervention (including decreased consumption of fast food and sugar-sweetened beverages, increased consumption of fruits, vegetables and spices, increased frequency of nutritional label reading, increased frequency in physical activity, increased frequency of cooking for one’s family, and a decrease in red meat consumption).⁴¹ Similar benefits were found as a result of a 5 week online cooking course.

Participants reported an increase in quality (fruit, vegetable, and vegetable protein) and frequency of home dinners, as well as an increased enjoyment in these at home dinners. Participants also reported an increase in perceived ease of avoiding processed foods and instead preparing fresh, healthy foods. Participants were able to manage portions, and manage cooking time with ease.⁴² A 10-week cooking intervention showed an increase in self-efficacy in preparing meals at home, especially proteins in parent-child dyads. Furthermore, families reported an increase in ease of preparing foods at home, an increase in their enjoyment of cooking, and an increased desire to cook post-intervention. Participants significantly decreased the proportion of dinners consumed away from home from 56% before the intervention to 25% afterwards ($F(1,161) = 16.1, p < 0.05$).⁴³ The effects of these cooking interventions may persist into the longer term. An 8-week cooking intervention conducted in low-income parents found an increase in fruit and vegetable consumption frequency, and a decrease in ready-made meal consumption frequency. The reported increases in confidence related to cooking from basic ingredients, tasting new foods, preparing and cooking new foods, and following a simple recipe were maintained 1 year post-intervention.⁴¹ Thus, moderately intense cooking interventions have been shown to be effective in both the short- and long-term in increasing preparation of foods at home, increase in diet quality, and increase in knowledge and self-efficacy related to at home cooking.

Eating Domain

Vidgen and Gallegos describe the eating domain as “both the act of eating and its consequences.” The 3 components of the eat domain address “understanding that food has an impact on personal wellbeing, demonstrating self-awareness of the need to personally balance food intake, and joining in and eating in a social way.”²⁵

A systematic review of randomized controlled lifestyle interventions in low-income populations was conducted. Of the 35 studies included, 13 trials included a dietary intervention, with women comprising 72.4% of all participants. Intervention format ranged widely, from self-help materials to individual and group counseling and classes. These dietary interventions showed to have a small but

positive impact on diet quality (SMD 0.22, 95% CI 1.34 to 1.89). Some of these effects were shown to be maintained in the longer-term, up to 12-months post-intervention (SMD 0.16, 95% CI 0.08 to 0.025, $I^2=41\%$).⁴⁴

Dietary interventions conducted in low-income women have also shown small but positive effects. A one-time online nutrition intervention, styled as a cooking show, was delivered to rural, low-income women during a clinic visit. At 3-months follow-up, participants showed an increase in dietary fat knowledge, increase in percent reporting reading nutritional labels to glean calorie and fat content of a food, increase in readiness to change for fruit and vegetable, and fat consumption, and a decrease in reported barriers to reducing fat content.⁴⁵ A 3-session WIC intervention spanned over 6 months aimed at increasing fruit and vegetable, whole grain, and low-fat milk content in participating women and children was also shown to have positive effects. Post-intervention, women reported permeation of key delivered nutrition messages, including those related to fruit and vegetables, whole grains, and low-fat dairy. Participants also reported a significant change towards higher levels of readiness to change, an increase in fruit and vegetable consumption, and increase in juice consumption, and an increase in low-fat milk consumption in both mother and child.⁴⁶ An 8-week wellness intervention in low-income women addressing diet, physical activity, sleep, and mental health showed a significant increase in nutritive diet score, and an increased physical health-related quality of life score in participants versus the control group ($p < 0.05$). Focus group data showed participants felt “accepted” during the group intervention, “satisfied” with the program and outcomes, and reported “low participant burden” during the intervention.⁴⁷ A similar wellness intervention in low-income women aimed at weight loss through diet and exercise showed a significant decrease in body weight, body fat percentage, and waist circumference in participants after the intervention ($p < 0.05$).⁴⁸ In summary, current literature shows that lifestyle and dietary interventions are effective in both the short- and longer-term in low-income women.

Formative Evaluation

A formative evaluation is conducted during the development or delivery of a program with the intent of providing feedback. Formative evaluation is not focused on program outcome or effect, but rather in program design and implementation. It serves to identify areas of success and those that need improvement. Its focus includes “program plans and design... identifying obstacles or unexpected opportunities, and identifying midcourse corrections that will increase the likelihood of a program’s success.”⁴⁹

The present study discusses the results of a formative evaluation of *Moms in the Kitchen*. Participant perception of key aspects of program design and implementation were assessed and analyzed as a way of refining the *Moms in the Kitchen* program in a way that is both outcome and participant centered. The efficacy of *Moms in the Kitchen* is reported elsewhere. Preliminary results show an increase in self-efficacy scores, and an increase in scores related to certain food literacy components, such as meal planning and selecting fruits and vegetables in season. Results from this formative evaluation will serve as feedback in revising *Moms in the Kitchen* for implementation and extension in other low-income communities.

Formative evaluations have been widely used to assess the feasibility, appropriateness, and acceptability of health-related programs, and to aid in their adaptation and modification for future implementation.⁵⁰ Common methodologies include focus groups and key informant interviews. Recurrent themes identified through nutrition or food literacy related formative evaluations include program recruitment and retention, logistics (both related to program implementation and participant attendance), and barriers and facilitators to program attendance and adoption.⁵¹⁻⁵⁵ A formative evaluation conducted in educated, mostly African American women, aimed at planning a nutrition intervention used a semi-structured interview guide based on the RE-AIM (Reach, Effectiveness, Adoption, Implementation, and Maintenance) framework. Key themes that emerged were “healthy eating focus” during recruitment, “positive health changes” resulting from the intervention, and “logistics” such as time and geographic

location. The cost of healthy foods and the skills required for cooking and meal planning were identified as barriers. “Motivation, resources, and training” were identified as facilitators to continued program maintenance.⁵¹ A formative evaluation of a program conducted in pregnant WIC clients using the Expanded Food and Nutrition Education Program model (EFNEP) found similar themes. Focus groups, retrospective record review, and program implementation index review yielded positive themes related to recruitment of target population, completion of all other evaluation instruments (such as surveys and forms). Negative themes identified included issues retaining participants due to program length, and deviation from the indented intervention delivery timeline.⁵⁴ A formative evaluation aimed at better understanding the perspective of parents challenged with feeding toddlers and young children was conducted through focus groups. Identified themes included perceived benefits to family mealtime, barriers to family mealtime (largely related to family dynamics), and challenges with self-efficacy and skill related to meal planning and cooking.⁵³ These themes highlight areas future nutrition interventions might target. Results of a formative evaluation of a 6-week, chef-led cooking program in low-income families included 4 major themes: logistics, program suggestions, perceived impressions and impacts, and chef involvement. Semi-structured interviews conducted in both the participants and program facilitators (chefs) showed high potential for the program to increase participant self-efficacy, motivation, and behaviors related to cooking.⁵⁵ In summary, current literature suggests that formative evaluation of a nutrition program has the potential to elicit valuable themes useful in the development and refinement of a such programs.

Methods

Development of a theory-based program

The theoretical foundation of *Moms in the Kitchen* is based on Vidgen and Gallegos’ definition of food literacy, incorporating constructs from Bandura’s Social Cognitive Theory (figure 2).^{25,56} The 4 food literacy domains serve as a guide for session content, with equal class time spent on participant education

and skill development within each domain. Food literacy was measured by examining participant self-efficacy, knowledge, behavior, and empowerment prior to and after *Moms in the Kitchen*. Outcome results of *Moms in the Kitchen* were reported elsewhere. Under Bandura’s model, knowledge and self-efficacy serve as determinants to behavior change, along with behavior and empowerment as outcomes relating to short-term change in food consumption for optimal health, and longer-term improved health outcomes.

Figure 2. Conceptual framework for *Moms in the Kitchen*

All four food literacy domains were incorporated into the curricula for each session, addressed either verbally in group discussion, as a printed resource, or as a skill to be developed over the course of the program. The “plan and manage”, and “select” domains were largely covered during the discussion circle and in written materials centered around knowledge and behaviors related to these domains, such as

an understanding of unit pricing and how to create a weekly dinner menu and accompanying grocery list. The “prepare” domain focused on the behaviors and knowledge necessary to create a meal using provided ingredients and cooking tools to prepare a meal. Lastly, the “eat” domain consisted of engaging participants in behaviors that foster a health relationship with food, such as eating in a social way, and general nutrition education. The flow and structure of the class ensured that a knowledge, and behavior or skill component addressing each of the 4 domains was included in each class. When possible, educational materials from established sources were used, such as those published by the Food and Drug Administration’s My Plate. This being one of the first food literacy based cooking interventions, much of the curriculum was developed to suit the specific needs of the study population and ensure all threads within each domain were met.

Recruitment

Moms in the Kitchen was supported by two grants from the National Center for Advancing Translational Sciences, of the National Institutes of Health, and the Sisters of the Humility of Mary. *Moms in the Kitchen* was approved by City of Cincinnati Health Department, Ohio Department of Health, and University of Cincinnati Institutional Review Boards.

Various methods of convenience sampling were used to recruit participants for *Moms in the Kitchen*. Participants were recruited from the WIC agency located in the Roselawn area of Cincinnati, Ohio. Flyers were hung in the lobby of the WIC office and patient exam rooms. Passive recruitment methods, such as tabling in the WIC waiting room and hung flyers, were not found to be effective. Recruitment methods were altered to include more active recruitment approaches. The research team alternated making announcements several times weekly at peak visit hours and during group nutrition education sessions. WIC dietitians referred select participants by distributing flyers to clients. The research team continued tabling during peak visiting hours, with the addition of approaching and engaging mothers in the waiting room. Interested participants were instructed to sign up with study staff if

present, or to call, text, or email the contact information provided on the study flyer. A total of 28 participants were recruited.

Interested participants were screened for eligibility via phone by a research assistant. Participants were included if they were the caregiver primarily responsible for feeding their family, the mother of at least 1 child, not currently pregnant and with no plans to become pregnant, at least 18 years old, proficient in English, and able to commit to attend at least 4 of 6 classes. If eligible, participants were enrolled. In addition, participants were asked about their general likes and dislikes regarding ingredients, foods, and flavors to best provide ingredients and recipes that would appeal to participants. Text message reminders were sent to participants the day before each class. Text and email communication outside of class was also used to coordinate recipe and ingredient selection, and for participants to share successes or struggles in the form of pictures and text in applying learned knowledge, skills, behaviors at home.

Moms in the Kitchen Overview

Upon arriving to the first class, participants were consented by the primary investigator. Upon receiving consent, the pre-test was administered. Participants were given a binder in which to place class materials each week. These handouts and resources addressed all 4 domains of food literacy, including creating a grocery list from a weekly menu plan, strategies for grocery shopping on a budget, easy recipes, and traditional nutrition education focused around USDA's MyPlate. As requested by participants, these binders were held by the research team during the week, and distributed at the beginning of each class. At the end of the 6 classes, participants were sent home with their resource binder.

Each class followed a similar pattern, framed around a weekly food-based theme. All 4 domains were addressed each class, as well as knowledge, behavior, skill, and self-efficacy components within each domain (table 6 in appendix). Each class began with a discussion circle, followed by cooking a meal

at individual cooking stations, ending with eating together as a group, evaluating the recipe, and a short lesson on nutrition (figure 3). Attendance was taken at the beginning of each class.

Figure 3. Class flow diagram

The “plan and manage” domain was largely addressed at the beginning of each class during the discussion circle. A PowerPoint visual aid was used to guide discussion, and show pictures taken by the researchers to illustrate shopping strategies and label reading, and pictures submitted by participants of their cooking attempts at home. Topics included strategies during grocery shopping, meal and menu planning, and creating a grocery list.

The “select” domain was also addressed during the group discussion. Content for this domain was focused around pulling together resources to create the meal planned in the previous domain, such as using unit pricing and reading nutrition labels to select ingredients, how to determine the ripeness or freshness of produce, and the acquisition of common cooking tools to prepare a meal.

The discussion circle was guided by a PowerPoint visual aid, and was facilitated by the research team (DK, with FCU assistance). The PowerPoint served to keep discussion focused on various aspects of food literacy, and provide a visual component to enhance learning, particularly for challenging topics such as unit pricing. The PowerPoint was also used to display participant pictures submitted via email or text, as a positive reinforcement and praise of their application of skills learned in class at home. The

discussion circle importantly provided an opportunity for group members to know one another and establish group cohesion by sharing ideas, tips and tricks, asking and answering each other's questions, and suggesting future topics for discussion to the research team.

At the conclusion of the discussion circle, participants selected their ingredients from those provided to use during the "prepare" portion of the class. The women were encouraged to try new ingredients or flavor combinations. Each participant had their own cook station, equipped with an electric stove top burner, the appropriate pots and pans for the recipe of the day, cooking utensils, and essential cooking ingredients (such as cooking oil, salt, and pepper). A sink with hot water and soap, disposable table cloths, a first aid kit were available. All wires and electrical cords were taped to the floor, and all food was kept in insulated coolers or a refrigerator until use to ensure a safe cooking environment. Recipes were selected based on ease, use of WIC approved ingredients, nutritional considerations, participant taste preferences, and time limitations. Led and supervised by the research team (DK, and FCU respectively), participants independently prepared their own meals, including chopping produce, cooking proteins and vegetables, and using spices and sauces to add flavor. Best practices while using kitchen equipment, and food safety principles were emphasized and demonstrated by the research team.

Once the cooking portion was complete, participants gathered to consume and share the meal they prepared in a social and engaging way. Women were encouraged to share with the group what went well during the class, and what they found challenging. Participants also filled out a survey rating the recipe.⁵⁷

During the "eat" component, a PowerPoint presentation was used as a visual aid to guide discussion and activities aimed at increasing general nutrition knowledge about the food-based theme of the class, and engage the participants in fun, nutrition-based games. The nutrition topic varied every week, highlighting a food group component of MyPlate featured in that week's recipe.

At the conclusion of each class, participants packaged up the food they prepared, as well as any uncooked ingredients they wished to take home. Childcare during the class was provided. At the end of the last class, participants filled out the post-intervention survey, and scheduled an appointment for an individual formative evaluation intervention. Participants received their program incentive, a cooking utensil or tool, at the conclusion of the interview. Table 1 provides a breakdown of class time allocation.

Table 1. Class time allocation breakdown

Schedule	Time	Class component	Food Literacy Component
10:00am-10:10am	10 min.	<u>Discussion circle</u> Welcome Introductions General announcements	
10:10am-10:30am	20 min.	<u>Discussion circle</u> Grocery store strategies Menu planning Creating a grocery list Sharing pictures	Plan and manage
10:30am-10:50am	20 min.	<u>Discussion circle</u> Sharing pictures Unit pricing Healthier substitutes	Select
10:50am-11:00am	10 min.	Select ingredients Set up cook station	Select
11:00am-11:35am	35 min.	<u>Cooking</u> Instructor led and supervised cooking Participants prepare own meal with self-selected ingredients following recipe	Prepare
11:35am-12:00pm	25 min.	<u>Eat and Evaluate</u> Consume food in social way Evaluate recipe MyPlate nutrition education PowerPoint Nutrition game or activity	Eat
12:00pm-12:10pm	10 min.	Participants pack up food, extra ingredients to take home	
12:30pm-1:30pm	1 hr.	Research staff clean and sanitize cooking utensils, materials, and conference room Store clean cooking materials for next class	

Recipe evaluation

Recipes used during the *Moms in the Kitchen* program were chosen and adapted to meet the following criteria: 1) Minimal cooking equipment required; 2) minimal cooking skills required; 3) majority of ingredients as WIC-approved foods; 4) preparation and cooking time of no more than 30 minutes; 5) ease of ingredient modification or substitution to match taste preference and foods available. While recipes were researcher selected, modified, and tested, participants had a choice of ingredients to use for the recipe of the day. For example, participants chose from a variety of proteins, vegetables, seasoning, and condiments to include in their stir fry. Participants were encouraged to try new ingredients, seasonings, and sauces. Participants from all three cohorts evaluated recipes during the final “eat” portion of the class using a modified recipe evaluation form.⁵⁷ Recipes were evaluated on appearance, taste, texture, odor, and overall using a 6-point Likert scale. A score of 1 represented dislike of the recipe, as indicated by a “yucky” smiley face above the number 1 on the scale. A score of 6 represented approval of the recipe, as indicated by a “yummy” smiley face above the number 6 on the scale (figure 4).

Figure 4. Recipe evaluation scale

Taste Test Form

Directions: Circle the number that best answers each question. 1 is the worst and 6 is the best.

How does the food look?	1	2	3	4	5 6
How does the food taste?	1	2	3	4	5 6
How is the texture? How does the food feel in your mouth?	1	2	3	4	5 6
How does the food smell?	1	2	3	4	5 6
How would you rate the food overall?	1	2	3	4	5 6
Office Use Only					
Panelist Code:	Date:				

Formative evaluation

During the final class, participants scheduled a time to individually meet with members of the research team for an interview. These semi-structured exit interviews were conducted 1 week following the intervention. The semi-structured interview guide was based on formative evaluation questions used by Condrasky et al. to evaluate a food literacy based cooking intervention program.⁵⁵ Modifications to interview questions were made to better address the condition of the intervention. The semi-final version of the interview guide was reviewed by the research team. Once consensus was reached, the interview guide was provided to the study site WIC dietitians for review. The final version of the interview guide included questions and probes addressing recruitment, maintenance, format and content of classes, and suggestions for future improvements (see table 2).

The interview facilitator (FCU) asked the participant a series of opened ended questions, while another research team member took notes (DK). A 2-pass method was used, with the first pass consisting of the scripted question, and the second pass a probe provided as needed by the facilitator. Interviews were conducted in a fluid, semi-structured manner. While each section topic was addressed, a certain level of flexibility was maintained as to allow participants to comment on aspects of the program as ideas came to them, and to speak freely. At the conclusion of the interview, participants received their final incentive: a cooking tool with a maximum value of \$25.00, as selected by the participant. Once all interviews were conducted, notes were typewritten. Quotes, ideas, and topics were organized into themes by 1 member of the research team (FCU). Salient themes identified were then review by members of the research team consecutively (DK, SL). Consensus on themes and subthemes was reached by 3 members of the research team.

Table 2. Semi-structured interview guide

Topic & Question	Probes & Reminders
Overall	
What did you like best about the <i>Moms in the Kitchen</i> program?	
Recruitment & Maintenance	
Initially, what made you decide to attend this program?	<p>Was there something that made you interested in <i>Moms in the Kitchen</i>?</p> <p>Did someone or something encourage you to attend <i>Moms in the Kitchen</i>?</p>
What did you like about <i>Moms in the Kitchen</i> that made you keep coming?	
<p>We appreciate you coming to the classes.</p> <p>We know it can be hard to fit things like the <i>Moms in the Kitchen</i> program into your schedule.</p> <p>What resources would you wish to have to overcome these difficulties?</p>	
Format	
<p>Now we'd like to talk about your experience in the <i>Moms in the Kitchen</i> program.</p> <p>What do you think about the structure or flow of the class?</p>	<p>For example, in the beginning we'd sit in a circle and talk about shopping tips and meal planning. Then, we'd go to the work station and cook. Last, we'd come back to eat as a group and discuss nutrition.</p> <p>What about ____ did you like?</p> <p>What didn't you like?</p> <p>*For class section not mentioned by participant</p> <p>How did you like ____?</p>

Content	
What is the most helpful information you learned?	How have you used that information?
What are the most helpful skills you learned?	How have you used those skills?
What resources given in class were the most helpful?	<p>*If don't mention binder</p> <p>Comment on the participant binder provided during the program.</p> <p>Probe to get some/all of these answers</p> <ul style="list-style-type: none"> – What did you like about the binder? – What didn't you like about the binder? – Have you used the binder? – Will you use the binder in the future? <p>IF NO.</p> <ul style="list-style-type: none"> – Would a different format be better (paper version vs. electronic version)? – Do you like printed resources? – Do you prefer to use internet, electronic resources (google)? – Do you like having resources on hand, or prefer to seek out resources as you need them (google when you need a recipe, have a question, etc.)? <p>IF YES.</p> <ul style="list-style-type: none"> – Let's look through it. – Useful in binder form? Different form better? – What do you like about it? – What materials in the binder do you find useful? – Any materials you would like to have that are missing? – Like getting materials weekly, or would prefer to get all at once? – Would taking home the binder be better? <p>Printed vs. electronic version?</p>

Future Improvement	
How would you describe <i>Moms in the Kitchen</i> to a friend? or If you referred a friend, how did you describe <i>Moms in the Kitchen</i> ?	
Comment on the recruitment flyer.	
What ideas do you have to improve <i>Moms in the Kitchen</i> ?	
What did you like least about the <i>Moms in the Kitchen</i> program?	

Data Analysis

Mean scores for recipes were calculated using SPSS (version 23). Methods of analysis of qualitative data were adapted from those previously used in formative evaluations.^{52,55,58} Notes from the formative evaluation interview were typed, analyzed, and coded by 3 members of the research team. The questions used in the interviews provided clues to themes that may emerge during the interview process. Patterns of words, quotes, themes, perceptions, ideas, program suggestions and praise from interview notes were coded and classified into categories, themes, and sub-themes by 3 members of the research team working independently, in sequential order. Content was then reviewed and re-coded by the research team as a group until consensus on categorization and theme identification was reached.

Results

Group Characteristics

Cohort 1 of *Moms in the Kitchen* was comprised of 5 African-American women receiving WIC benefits in the Roselawn area of Cincinnati, Ohio. Participant characteristics are described in table 3.

Table 3. Group characteristics of cohort 1

Variable	Mean $\pm$ Standard Deviation
Attendance (out of 6 classes)	4.80 $\pm$ 1.10
Age (years)	28.80 $\pm$ 3.77
Number of children	2.60 $\pm$ 1.52
WIC users	100% $\pm$ 0.00
SNAP users	40% $\pm$ 0.55
Section 8 housing	0% $\pm$ 0.00
Medicaid users	60% $\pm$ 0.55
Temporary Aid for Needy Families user	20% $\pm$ 0.45
Supplemental Security Income users	40% $\pm$ 0.55
Food Pantry users	20% $\pm$ 0.45
Number of individuals in household	4.80 $\pm$ 1.30
Household income	\$30,000-40,000
Education	Vocational schooling
Race / Ethnicity	Non-Hispanic African American/Black
N = 5	

Recipe Evaluation

Across the board, participants rated recipes highly, with rating dishes averaging a score of 5.575 out of a possible 6.0. The first two dishes, egg frittatas and bean bowls, were not rated. Participants were most receptive to the stir fry dish and soup prepared in class. Participants also enjoyed preparing sliders. Of the dishes prepared, participants were least receptive to the pasta. Complete scoring for all dishes are presented in table 4.

Table 4. Recipe evaluation by dish

Dish & Variable	Mean $\pm$ Standard Deviation
Stir fry	
Appearance	6.00 $\pm$ 0.00
Taste	5.50 $\pm$ 0.58
Texture	5.75 $\pm$ 0.50
Smell	6.00 $\pm$ 0.00
Overall	5.75 $\pm$ 0.50
Soup	
Appearance	5.50 $\pm$ 1.00
Taste	5.25 $\pm$ 0.96
Texture	5.50 $\pm$ 1.00
Smell	5.75 $\pm$ 0.50
Overall	5.75 $\pm$ 0.50
Sliders	
Appearance	5.20 $\pm$ 1.30
Taste	5.00 $\pm$ 0.71
Texture	5.40 $\pm$ 0.89
Smell	5.80 $\pm$ 0.45
Overall	5.60 $\pm$ 0.55
Pasta	
Appearance	4.60 $\pm$ 0.55
Taste	5.00 $\pm$ 0.71
Texture	5.60 $\pm$ 0.55
Smell	5.80 $\pm$ 0.45
Overall	5.20 $\pm$ 0.84

Moms in the Kitchen participants found evaluated recipes to be highly acceptable in appearance, taste, texture, smell, and overall.

Formative evaluation

Data yielded 5 major categories, seen in table 5: general program feedback, facilitators to initial attendance, facilitators to continued attendance, barriers to attendance, and program satisfaction and suggestions for improvement. Overall, participants spoke positively of *Moms in the Kitchen*. Recurring themes and sub-themes across categories included satisfaction with class format and setup, satisfaction with class content, the learning environment, recipe ease and adaptability, social connections and cohesion, and trying new foods.

Table 5. Key categories, themes, and sub-themes

<u>Themes & Sub-themes</u>	<u>Participant Comments</u>
General Feedback	
Most Helpful Knowledge Learned	
Plan & Manage domain	
Planning meals	<ul style="list-style-type: none"> - One-week menu on refrigerator - Repurposing leftovers - What to have in the pantry
Nutrition	<ul style="list-style-type: none"> - How to incorporate dairy - Fiber source - Iron sources - Getting all the [MyPlate] foods on the plate
Select domain	
Nutrition	<ul style="list-style-type: none"> - Calcium, fiber, and iron sources - Using MyPlate to guide selection
Store strategies	<ul style="list-style-type: none"> - Unit pricing - Sales - Couponing - Price comparison across stores - Only frequenting stores that accept WIC or SNAP benefits
Prepare domain	
Avoiding common cooking mistakes	- Adjusting cooking temperature – “can’t cook everything on high”
Following and adapting a recipe	- Choices [of ingredients] within recipes
Food science of water	- Liquids in cooking
Measuring	- Measuring liquids

Most Helpful Skills Learned	
Plan& Manage domain	
Meal planning	- How to get family involved
Select domain	
Store strategies	- Unit pricing - Couponing - Price comparison across stores
Prepare domain	
Knife Skills	- Chopping – “my sister gave me Wolfgang Puck knives for Christmas but I couldn’t use them. Now I can!”
Cooking	- Putting ingredients together - Preparing basic meals that are different - Preparing basic meals that are easy for families
Troubleshooting cooking mistakes	- Excess liquid - Balancing flavors
Food science of water	- Cooking frozen foods - Excess liquid – “I never realized how many dishes I messed up with water. Now I know I can use a paper towel.”
Measuring	- Proper measuring tools for solids and liquids - Proper technique for measuring liquids
Confidence	
Select domain	
Store strategies	“For the first time, I didn’t run out of food stamps before the end of the month. I had enough to throw a birthday party for the twins.”
Prepare domain	
Knife skills	- Chopping – “I had tried to learn before but never could. My friend works in a kitchen and she tried to teach me. I can’t wait to call her up and tell her I can chop now.”
Cooking	- “Thank you for cooking confidence. I didn’t know I lacked it.”
Positive feedback	- “People liked the food I made.”

Resource Binder	
Content	<ul style="list-style-type: none"> - Provided ideas - “Good resource”
Format	<ul style="list-style-type: none"> - Liked binder - Liked recipe format
Organization	<ul style="list-style-type: none"> - “Well organized”
Describing Program to Others	
Educational	<ul style="list-style-type: none"> - Learned a lot - Helps moms cook health meals for their family - Learn basic meals that are different - Learn meals that are easy for families - Learned knife skills
Enjoyment	<ul style="list-style-type: none"> - Fun - “Hate to see it’s over.” - Liked the experience
Motivation	<ul style="list-style-type: none"> - “[<i>Moms in the Kitchen</i>] motivated me to cook more.”
Sharing	<ul style="list-style-type: none"> - Taking home food prepared in class - Sending pictures of prepared food to friends and family - Inviting friends and family to class - Sharing prepared food with classmates
Satisfaction with cooking	<ul style="list-style-type: none"> - Hands-on – “actually an in-cooking class,” “I survived cooking classes.” - Like cooking equipment used
Satisfaction with recipes	<ul style="list-style-type: none"> - Like recipe format – “good and simple” - Recipes were “like mom’s” - Family-friendly recipes - Recipes adaptable to family preference – “you get to pick your ingredients”

Facilitators to Initial Attendance	
Mom Time	- Getting out the house
Changing Diet	- Eating fast food - Illness – “I was sick after having the baby. I need to get back on track.”
Interest to Increase Cooking Skills	- Other household members do majority of cooking - “I always wanted to learn more about cooking”
Program Name	- <i>Moms in the Kitchen</i>
Recruitment	- Recruited by WIC dietitian - Free study – “go in with low expectations”
Facilitators to Continued Attendance	
Class Format	
Class size	- 6 women per class
Class structure	- Ice breakers - PowerPoint visual aid - Discussion circle - Sharing home cooking experience
Learning environment and setting	- “Class flowed even though we were making different stuff,” “flowed even with hiccups” - Organized - Well put together - Professional - Relaxing - Affirmation – “as long as you make progress, you’re okay”
Level of classes	- Simple, not overwhelming - “Didn’t feel like school”
Number of classes	- 6 weeks appropriate - 6 weeks not enough - 8 weeks excessive
Class time	- Not rushed, good pace - 2 hours appropriate - Time enough for each part [of class]

Prepare domain	
Cooking	<ul style="list-style-type: none"> - Cooking as a group - Cooking at same pace - Hands-on cooking
Eat domain	<ul style="list-style-type: none"> - Eating as a group - Trying new fruits - Calcium game
Class Content	
Prepare domain	
Choice	- Picking foods and ingredients
Recipe ease	<ul style="list-style-type: none"> - Easy - Simple - One pan recipes
Recipe adaptability	<ul style="list-style-type: none"> - Ingredient substitution suggestions for food on hand - “Have most of these ingredients in my pantry anyway” - Adaptable - “You can put your own twist on things” - “I kept coming because when I messed up a recipe, it didn’t matter because we could fix it”
Eat domain	
Recipe evaluation	- Enjoyed process of evaluating recipes
Trying new foods at low risk	<ul style="list-style-type: none"> - Tasting new foods and recipes - Trying difference spices, sauces - Trying food at no cost - Expanding family palate - Sharing meals with classmates
Learning Environment	
Communication	- Text reminders
Instructors	<ul style="list-style-type: none"> - Knowledgeable - Informal - Open to suggestions - Motivating
Informal	- Comfortable – “not Julia Child or a chef”

Social Connections	
Anticipation	<ul style="list-style-type: none"> - “What are we cooking next week?” - Excited to come - Look forward to next class
Social cohesion	<ul style="list-style-type: none"> - Sharing food - Re-connecting with old friends - Texting classmates - Getting to know classmates - Like a moms group - Common ground with other women
Technology	<ul style="list-style-type: none"> - Sending photos of recipes from home - Text reminders
Logistics	
Location	<ul style="list-style-type: none"> - Centrally located - WIC - Church
Childcare	<ul style="list-style-type: none"> - Available at all classes
Commitment	<ul style="list-style-type: none"> - Rather come late than miss class - “I picked my ingredients last week, I didn’t want to waste the food.” - Commitment to attendance – “want to see it through”
Schedule and routine	<ul style="list-style-type: none"> - Getting out every Tuesday
Barriers to Attendance	
Illness	<ul style="list-style-type: none"> - Chronic illness - Sick child
Work	<ul style="list-style-type: none"> - Changing work schedule
Transportation	<ul style="list-style-type: none"> - Malfunctioning car - No car, walked to class

Program Satisfaction and Suggestions	
Class Format	
Prepare domain	
Cooking	<ul style="list-style-type: none"> - Cooking as a group - Cooking at same pace - Hands-on cooking
Eat domain	<ul style="list-style-type: none"> - Eating as a group - Trying new fruits - Calcium game
Class Content	
Prepare domain	
Choice	- Picking foods and ingredients
Recipe ease	<ul style="list-style-type: none"> - Easy - Simple - One pan recipes
Recipe adaptability	<ul style="list-style-type: none"> - Ingredient substitution suggestions for food on hand - “Have most of these ingredients in my pantry anyway” - Adaptable - “You can put your own twist on things” - “I kept coming because when I messed up a recipe, it didn’t matter because we could fix it”
Eat domain	
Recipe evaluation	- Enjoyed process of evaluating recipes
Trying new foods at low risk	<ul style="list-style-type: none"> - Tasting new foods - Tasting new recipes - Trying difference spices, sauces - Trying food at no cost - Expanding family palate - Sharing meals with classmates
Equipment & Setup	<ul style="list-style-type: none"> - Liked kitchen equipment used - Liked [kitchen equipment] prize at the end
Technology	<ul style="list-style-type: none"> - Suggested private Facebook group for moms - Record classes and post on online

Key

Categories – gray shading

Themes – green shading

Sub-themes – blue shading

General Feedback

Key themes within the general feedback category included helpful knowledge learned, helpful skills learned, confidence, the resource binder, and describing the program to others. Participants commented on program content and activities, applying knowledge and skills gained at home, the usefulness of the resource binder, and how they would describe *Moms in the Kitchen* to future potential participants.

Facilitators to Initial Attendance

Participants identified what factors led to their signing up for the program and attendance on the first day. Key themes within the facilitators to initial attendance category included personal time, changing diet, increasing cooking skills, and recruitment. Overall, participants were seeking a program to help them pivot towards a healthier lifestyle focused on consuming foods prepared at home.

Facilitators to Recurrent Attendance

Key themes within the facilitators to recurrent attendance category included class format and content, the learning environment, social connections, and logistics. Overall, women liked the class structure and content. A simple, straightforward curriculum allowed the women to feel comfortable with the content and skill level presented during the course. An informal, relaxed learning environment was important to participants as well. Participants enjoyed having a choice in their ingredients and flexibility within a recipe. Overall enjoyment of the class was key to their attendance: many went it with low expectations for the program, with the thought that if they were unsatisfied with the program, they would simply not continue. The social component of *Moms in the Kitchen* was critical to the high attendance rate. Social cohesion within the women contributed to an expectation of arriving to class, and enjoyment

of the program during class. Women also reported a central location and provided childcare as important facilitators to attendance.

Barriers to Attendance

Participants identified illness, transportation, and work responsibilities as major barriers to attendance. Chronic and acute illness in both mother and child prevented participants from attending classes. Several women had unreliable transportation that affected attendance, ranging from use of a car provided by their employer, auto repair issues, to lack of access. An unreliable or variable work schedule also impacted participant attendance.

Program Satisfaction & Suggestions

Key themes within the program satisfaction and suggestion category included class format and content, equipment and setup, and use of technology. Participants enjoyed the class format, particularly cooking and sharing food as a group. They enjoyed the ease and adaptability of the recipes selected, and liked selected their own ingredients and trying new foods. They also enjoyed evaluating the recipes at the end of each class. Participants liked the setup of the class and the kitchen equipment used. Women suggested a private Facebook group for women to communicate with each other between classes, share recipes and photos. They also suggested video recording the classes and posting them online, either on Facebook or YouTube, so absent participants could watch the class on their own.

Discussion

Results from the present study well align with those of other formative evaluations of nutrition-related programs. A formative evaluation assessing recipes provided to food pantry users and WIC clients used a similar, 3-point smiley scale to rate recipes. Recipes were also tested by WIC participants off-site by providing the recipes and ingredients to try at home. Overall, recipes were rated highly, with 80% of women giving the recipes highest marks.⁵² Our results, in conjunction with those of Evans et al., show

that low-income populations are amenable to trying a variety of foods and recipes, particularly when presented at little to no cost.

Barrier identified in the present study resonate with those identified in other formative evaluations. Recurring themes include the burden of meal planning and cooking, logistical issues (such as scheduling, time commitment, and location), and social support.^{51,53,55} Similar to those of *Moms in the Kitchen*, Huye et al. reported accountability, researcher contact and follow up, resources and training, and motivation as facilitators related to the implementation and maintenance of the program.

While *Moms in the Kitchen* faced challenges in the recruitment of participants, retention of participants after the initial meeting was successful. Programs conducted in similar populations reported the converse after a formative evaluation. Boyd et al. cited retention and attrition as negative themes. The length of the program was highlighted as a potential cause of issues related to program attendance.⁵⁴ Participants of *Moms in the Kitchen* spoke positively about the duration of each class (2 hours) and the length of the program (6 weeks).

Lessons Learned

Recruitment for *Moms in the Kitchen* was challenging. Active forms of recruitment, including approaching women in the WIC waiting rooms individually and making announcements during WIC group classes, proved more fruitful than passive forms of recruitment, such as tabling in the WIC waiting room, and hanging flyers. Of the 28 women recruited for cohort #1, and of the 12 women confirmed their attendance over the phone prior to the first class, only 5 women participated. Women who were recruited but did not confirm their attendance or expressed interest cited work commitments, childcare, and transportation as barriers to attending. This matched our results from the program evaluation.

Key lessons from implementation of a cooking intervention included troubleshooting and avoiding logistical issues. Venue requirements should include a room that has a space for discussion circle and PowerPoint presentation, sufficient space for several tables (1 for every 1-2 women), sufficient

electrical outlets, adequate air circulation for ventilation, a separate space in which childcare can be provided, a sink or dishwasher for cleaning kitchen equipment, and store space for kitchen equipment when not in use. Testing of the electrical outlets prior to class is of critical importance. On several occasions, the fuse in the conference room used was blown as a result of using several electric conduction burners at once.

Strengths and Limitations

While *Moms in the Kitchen* was perceived as a worthwhile and useful program by participants, there are some limits to the design and implementation of the program. A small and fairly homogeneous sample of participants, namely low-income African American women of the same neighborhood, limits generalizability. Due to logistical restraints, interviews were not recorded, transcribed, and coded in the usual method used when working with qualitative data. Lastly, much of the content and all evaluation tools used were not validated as food literacy is an emerging concept in the field of nutrition research. Such tools do not yet exist.

Despite these limitations, *Moms in the Kitchen* serves as a promising guide to future nutrition professions aiming to develop an intervention that address all components of food literacy. *Moms in the Kitchen* is one of the 1st comprehensive food literacy interventions to be both qualitatively and quantitatively evaluated for both process and outcomes (reported elsewhere). *Moms in the Kitchen* is also one of the first food literacy interventions grounded in theory and rooted in a conceptual framework derived from food literacy research conducted in low-income women. Inspiration for *Moms in the Kitchen* comes not only from prominent nutrition research, but the expertise and experience of the WIC dietitians and staff members working with low-income women. They provide critical insight into the lives of the women we attempted to recruit, and were instrumental in the development of a program that would be acceptable and successful for WIC mothers. *Moms in the Kitchen* may serve as a template for other nutrition professionals hoping to develop an experiential, integrative food literacy cooking intervention.

Conclusion

Moms in the Kitchen was perceived as successful, useful, and fun by women who participated. Participants rated recipes used in class highly, with an average overall rating of 5.6/6. Categories identified through a qualitative, formative evaluation of the program include general program feedback, facilitators to initial attendance, facilitators to continued attendance, barriers to attendance, and program satisfaction and suggestions for improvement. Recurring themes across all categories include satisfaction with class format, setup, and content, the learning environment, recipe ease and adaptability, social connections and cohesion, and enjoyment of trying new foods.

Implications

Key facilitators and barriers identified through the end of study formative evaluation, as well as lessons learned and content developed may serve as a template for other nutrition professionals hoping to develop a comprehensive, theory based, experiential cooking intervention aimed at improving and increasing food literacy in low-income populations.

Future Research

The success of *Moms in the Kitchen* highlights the need for future research. Similar programs, formative evaluations, and outcome measure are needed in larger sample that are geographically and ethnically diverse. Inclusion of men, children, partners, and households as a family cooking intervention may serve to increase the success and outcomes of a food literacy intervention, and may help reduce certain barrier to attendance, such as childcare and transportation. Lastly, validation of a food literacy tool in low-income populations is necessary, as the emerging concept of food literacy permeates nutrition research in varying parts of the world.

Appendix

Table 6. Curriculum

Class	Topic	Plan & Manage	Select	Prepare	Eat
#1	Extraordinary Eggs	Planning a meal Creating a grocery list	Determining egg quality	Egg frittata recipe	Eggs as a source of protein Egg “quiz”
#2	All-Star Beans	Versatility Stretching food dollars with beans by incorporating into meat recipes	Unit pricing	Bean bowl recipe	Beans as a source of protein and fiber Bean trivia
#3	Perfect Pasta	Preparation before grocery shopping	Price comparison	One pot pasta recipe Knife skills	Benefits whole grains Identifying whole grain products by label reading
#4	Super Soups	Menu planning and creating a grocery list	Selecting fresh produce Selecting lower-fat dairy options	Broccoli cheddar soup Knife skills	Dairy as a source of calcium and protein “Calcium poker” – determining intake
#5	Healthy Handhelds	Menu planning to reduce out of house food consumption Menu planning repurpose leftovers	Unit pricing Using WIC approved foods	Sandwich sliders	Building a MyPlate meal Tips to increase whole fruit consumption “Two Truths and a Lie” game – fruit nutrition
#6	Sizzling Stir Fry	Building a pantry with kitchen staples Planning a menu of MyPlate meals	Selecting produce Unit pricing	Stir Fry Knife skills	Benefits of vegetables Tips to increase vegetable consumption

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