Simple but Tailored: Developing Culinary-Focused Nutrition Education Along With a Produce Prescription Program

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INTRODUCTION

Only 1 in 10 Americans meet the recommended daily servings of fruits and vegetables, with consumption of greens, beans, and total vegetables remaining below optimal targets.1 Low intake of fruits and vegetables contrasts the nutrition guidelines for preventing and managing cardiometabolic diseases, and a high intake of fruits and vegetables is associated with a lower risk of these chronic diseases.2,3 Chronic diseases are costly and contribute to 90% of the $4.1 trillion in annual health care expenditures within the US.4 To address chronic disease, improving poor nutrition is critical, especially for underresourced communities because of their elevated risk of food insecurity, lower diet quality, and related poorer health outcomes.5–7

Produce prescription programs (PRx) are one approach to improving diet quality to prevent and manage chronic conditions. The produce prescription collaborative defines these programs as follows:

A medical treatment or preventative service for eligible patients due to diet-related health risks or conditions, food insecurity, or other documented challenges in access to nutritious foods, and are referred by a healthcare provider or health insurance plan.6

Most PRx programs provide a voucher to redeem at a local or farmer’s market.7 The provision of a PRx has demonstrated promise in supporting improved cardiometabolic health outcomes and dietary quality and offers an opportunity for patients, especially those with limited resources, to follow dietary recommendations by a medical provider.8,9

Although PRx programming continues to expand across the US, published examples of culinary-focused nutrition education to support and complement the provision of a PRx is limited. Given that culinary-focused nutrition education effectively promotes fruit and vegetable consumption, its use for maximizing the impacts of PRx programs is important.10 Such culinary nutrition education approaches should also be tailored as tailored nutrition education is more effective in promoting behavior change.11 Tailoring culinary-focused resources should also consider participants’ medical needs, literacy level, culture, financial resources, and medical condition—especially as many PRx programs focus on improving chronic disease management.10,11 In addition, because of direct support for improved access to produce in PRx programs, culinary-focused nutrition education efforts to align with a PRx, should also be evaluated for impact on food literacy—the planning, management, selection, and preparation for healthy eating.12 Changes in food literacy are associated with improved diet quality and fruit and vegetable consumption, which further emphasize the need for culinary-focused nutrition education and evaluation to include food literacy.13

The Fresh Start program integrated tailored nutrition education to address gaps in the lack of culinary-focused PRx nutrition education resources to align with a unique PRx implementation approach. The Fresh Start program is a healthy lifestyle program centered around a PRx to address underlying nutrition and lifestyle risk factors to improve chronic disease management and health outcomes with underresourced patients. This study aimed to examine the development, implementation, acceptability, and impact (eg, food literacy) of tailored culinary-focused nutrition education aligned with a PRx among underresourced participants in the Fresh Start program.

DESCRIPTION OF THE INTERVENTION

Program Overview

The Fresh Start program was piloted in the spring of 2022 in rural Eastern North Carolina with uninsured, underresourced patients with diabetes to address disparities within the
the socioecological model and includes a layered approach to address the complex social and community-level factors that influence an individual’s nutrition and health knowledge, attitudes, skills, and behaviors around healthy eating and living. The Fresh Start model included: one on one health coaching (knowledge, attitude, behavior), 9 face-to-face group classes with hands-on activities and opportunities to build food literacy and for social and peer interactions (knowledge, self-efficacy, and skills), and direct provision of produce as a PRx to move beyond fresh and includes frozen and/or canned fruits/vegetables to improve sustainability and alleviate potential food waste. The fresh vegetables provided as a PRx during the Fresh Start program included bell peppers, cabbage, carrots, collards, kale, green beans, spinach, squash, turnips, and zucchini, whereas the frozen vegetables included broccoli, cauliflower, and canned beans (kidney and garbanzo). In addition, the PRx intentionally focused on a nonstarchy vegetable for the class, and cooking demonstrations, recipes, and nutrition facts for that vegetable were integrated into the group class. Some vegetables were combined during group classes (eg, squash and zucchini, broccoli and cauliflower). Recipes and cooking demonstrations focused on preparing the nonstarchy vegetable in 3 different ways—most typically as a main dish, side dish, and as a snack to demonstrate different ways the vegetable could be incorporated into participants’ diet. The vegetables were prepared 3 ways, taste tested by program participants, and they were provided recipes and a nutrition education handout highlighting specific nutrients and health benefits of the vegetable. Recipes that guided the cooking demonstrations aligned with the PRx for that week were provided to participants as colorful handouts.

Development of the Culinary-Focused Nutrition Education

The recipes and nutrition education/facts handouts were developed and tailored for a participant group to be (1) simple with plain language, minimal steps, ingredients, cookware, and culinary techniques; (2) fast to address time/fatigue barriers to cooking/food preparation; (3) low-cost/economical using spices and ingredients easily found in dollar/corner stores; (4) culturally appropriate for the region and patient base (Southern, rural, primarily White or African American); and (5) medically tailored (low salt, saturated fat, starch/carbohydrates/sugar, high fiber). The decision to tailor recipes to be low in salt, saturated fat, and starch/sugar was due to the commonality of other cardiometabolic comorbidities (eg, hypertension) within our participants. The incidence of diabetes also leads to an increased risk of developing cardiovascular disease; therefore, ensuring low salt/saturated fat content of recipes can aid in preventing cardiovascular disease. The factors used to guide efforts to tailor the recipes were based on previous research and the experience of the principal investigator and authors with this patient population. We also considered barriers to cooking healthy meals and nutrition education needs as listed within the published literature for individuals with lower literacy and income.

The nutrition education/facts handouts for each nonstarchy vegetable used plain language, including pictures and color, to be visually appealing and to ensure appropriateness for participants with lower literacy. Nutrition education/facts handouts included nutrients and the specific health benefits for each nutrient that the vegetable the recipe focused on is a good or excellent source. All recipes were reviewed by a registered dietitian nutritionist to ensure they were medically appropriate while also abiding by the previously validated mortality risk with diabetes, and low access to specialty care. Participants (n = 54) were recruited from a free clinic serving 5 rural counties, which was a member of the North Carolina Association of Free and Charitable Clinics, a state organization member of the National Association of Free and Charitable Clinics that provides subsidized and/or free care to uninsured or underinsured patients. Eligibility criteria included being a current North Carolina Association of Free and Charitable Clinic patient, a medical diagnosis of prediabetes or diabetes and speaking English or Spanish. The program was delivered for 20 weeks from January 2022 through May 2022.

The Fresh Start program is grounded in the socioecological model and includes a layered approach to address the complex social and community-level factors that influence an individual’s nutrition and health knowledge, attitudes, skills, and behaviors around healthy eating and living. The Fresh Start model included: one on one health coaching (knowledge, attitude, behavior), 9 face-to-face group classes with hands-on activities and opportunities to build food literacy and for social and peer interactions (knowledge, self-efficacy, and skills), and direct provision of produce as a PRx with tailored culinary-focused nutrition. Student-trained volunteer health science students from East Carolina University conducted health coaching over the phone. Group classes were held in the fellowship hall of a local church identified by a clinic partner and were divided into 3 parts—a hands-on nutrition activity and lesson (eg, how to plan a week of healthy meals on a budget, food label reading), a physical activity demonstration that could be done at home with household items (eg, chair-based yoga, chair-based resistance training), and then a cooking demonstration and taste testing. The cooking demonstration included nonstarchy vegetables provided via the PRx for that class. Patients were typically provided 3–5 lbs of produce/class and culinary-focused nutrition education handouts to take home.
outlined requirements. All recipes were translated and available in Spanish for all Spanish-speaking participants (Figure).

Evaluation and Results

All participants (n = 54) in the Fresh Start program provided informed written consent before any survey, interview, or other data collection (Institutional Review Board no. UM-CIRB 21-001619) by the University and Medical Center at East Carolina University. Evaluation of program approach and materials was conducted in 3 ways: (1) a prepost program survey that included the validated food literacy questionnaire by Lavelle et al., that includes cooking and food skills; (2) a brief survey at the end of each group class (ranged 8–15 participants/class for the 9 group classes, from January to May, 2022); (3) a brief overall program experience, satisfaction, and expectations survey was conducted over the phone at the end of the program (n = 27); and (4) semi-structured phone interviews were conducted with a subsample of patients (n = 14) within a month after the program ended. The survey and interview guide was developed to evaluate the pilot Fresh Start program. All quantitative survey data were collected and managed with Research Electronic Data Capture, a Health Insurance Portability and Accountability Act-secure, web-based application designed to support data capture for research studies, and descriptive statistics were conducted using SPSS (version 28.0, IBM, 2021). Open-ended survey responses were summarized and reported in order of decreasing frequency. Interviews were transcribed verbatim and analyzed independently by trained research team members (n = 4). The research team used inductive content analysis to identify themes from the data. The research team met to discuss discrepancies and reach a consensus on all presented themes.

Food literacy scores were calculated using 19 questions scored from 1 to 7 (1 = very poor; 7 = very good); all the question scores were summed using the validated cooking and food skills questionnaire by Lavelle et al. This gave participants a total score ranging from 19 to 133. Total food literacy scores increased by an average of 12.8 points, which was statistically significant (*P* = 0.04, *t* = 2.16) (Table). Group class surveys included an open-ended question regarding participants’ “favorite” part of the class. Responses consistently reported that the produce, cooking demonstrations, and taste testing were a favorite part of the class. A second open-ended question in the

### Table. Food Literacy Outcomes of Rural, Uninsured, Low-Income, Participants from the Pilot Fresh Start Program (n = 19)

<table>
<thead>
<tr>
<th>Food Literacy Category</th>
<th>Preintervention</th>
<th>Postintervention Scores</th>
<th><em>P</em> (<em>t</em>)</th>
</tr>
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<tbody>
<tr>
<td>Total food literacy</td>
<td>85.8 ± 26.0</td>
<td>98.6 ± 19.5</td>
<td><em>P</em> = 0.04 (<em>t</em> = 2.16)</td>
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<tr>
<td>Meal plan and preparation</td>
<td>12.3 ± 4.4</td>
<td>14.8 ± 3.8</td>
<td><em>P</em> = 0.03 (<em>t</em> = 2.40)</td>
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<tr>
<td>Shopping skills</td>
<td>13.6 ± 5.3</td>
<td>14.8 ± 4.3</td>
<td><em>P</em> = 0.28 (<em>t</em> = 1.11)</td>
</tr>
<tr>
<td>Budgeting skills</td>
<td>18.7 ± 7.2</td>
<td>22.1 ± 4.8</td>
<td><em>P</em> = 0.04 (<em>t</em> = 2.18)</td>
</tr>
<tr>
<td>Nutrition resourcefulness</td>
<td>17.8 ± 4.9</td>
<td>26.4 ± 7.1</td>
<td><em>P</em> &lt; 0.001*** (<em>t</em> = 4.84)</td>
</tr>
<tr>
<td>Label reading</td>
<td>17.7 ± 9.0</td>
<td>20.9 ± 7.1</td>
<td><em>P</em> = 0.13 (<em>t</em> = 1.58)</td>
</tr>
</tbody>
</table>

*Determine with paired samples t test.

*P* < 0.05; ***P* < 0.001.

Note: Values are presented as mean ± SD.
group class survey asked about topics participants desired more information about, and participants reported a desire for expanded provision of recipes/cooking support. The end of the program phone survey revealed that most participants improved their diet quality (88.5%) and that the Fresh Start program increased their willingness to try new or unfamiliar produce (80.8%). Most participants also used the recipes provided during group classes (68%) and consumed most or half of the produce (43.5%, 39.1%, and 13%, respectively). The highest-ranked reasons for joining the Fresh Start program were to improve their health (96.3%), blood sugar control (96.3%), and to gain more nutrition information/education (88.9%). Based on open-ended questions in the final program evaluation of the PRx and culinary-focused nutrition education resources and support provided, kale and spaghetti squash was the most unfamiliar produce, kale was the favorite PRx produce, and the spaghetti squash with marinara was one of the most favored recipes. Notably, many unfamiliar produce, favorite produce, and favorite recipes were reported. The themes identified through the post-program interviews identified a strong desire to be more involved in the cooking components of the group classes and expanded recipe support with a greater variety of snacks, sides, and overall meals/dishes.

Discussion, Implications, and Future Plans

The Fresh Start program demonstrates the development of an innovative, tailored culinary-focused nutrition education approach aligned with a PRx integrated within a community-based program. This approach was impactful on food literacy and willingness to try new vegetables. Participants also used recipes with nonstarchy vegetables after they were introduced and aligned with the PRx. Evaluation results and program feedback identified a need to further expand the culinary/cooking support through hands-on cooking and that providing more recipes is desirable. Although this study contributes to a limited body of research around educational materials and approaches aligned with a PRx, there are limitations to this work. The program leadership team selected produce before program implementation to align the PRx with the cooking demonstrations and culinary-focused resources. A variety of produce was selected and provided to patients during group classes that aligned with cooking demonstrations vs the provision of a voucher to be redeemed by participants. This approach limited participant choice of produce; however, this diversity in exposure to numerous unfamiliar vegetables led to a high willingness of participants to try new or unfamiliar produce postprogram. The study population was specifically rural, southern, and uninsured, and these results may not be generalizable to other populations. Final program evaluation data collection was limited by communication barriers (eg, participant phone numbers disconnected) to collect final program and endpoint surveys for food literacy; future studies with larger sample sizes are needed. Although there are limitations to this work, it does provide a foundation that future PRx programs or programs with cooking/curricular medicine can build. In addition, few programs have evaluated the impact of programming on food literacy with a validated tool, and as PRx, culinary medicine, and other hands-on nutrition and food programs expand, quality evaluation metrics around food literacy are essential but lacking in many studies.

Future implementation of the Fresh Start program intends to expand the hands-on involvement of program participants with cooking and expand the provision of nutrition education resources for healthful cooking, eating, and additional recipes. These additional recipes will increase exposure to new or unfamiliar vegetables, with an ongoing focus on nonstarchy vegetables, including asparagus and eggplant, as participants specifically requested. Finally, we are also exploring the provision of hybrid and supplementary culinary and nutrition education through social media and/or an application-based approach. This is due to the rurality of the region with which the program is delivered and transportation and scheduling being consistent barriers that hinder some participants from attending the group classes. We are also exploring alternative community partnerships and approaches to the provision of the PRx with these expanded virtual options (eg, delivery or pick up at partner clinics) to ensure consistent provision of food for this population with limited resources.

NOTES

This study was approved by the University and Medical Center Institutional Review Board at East Carolina University (Institutional Review Board no. UMCIRB 21-001619), and all participants provided informed written consent before any survey, interview, or other data collection. The study was supported by The Duke Endowment Foundation. The authors would like to thank the North Carolina Association of Free and Charitable Clinics for their partnership to implement the Fresh Start PRx program, collaboration with the Society of St Andrew to recover local produce, and all of the student volunteers from East Carolina University who worked on this overall project.

SUPPLEMENTARY DATA

Supplementary data related to this article can be found at https://doi.org/10.1016/j.jneb.2023.07.013.

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