Delivery of a community-based nutrition education program for minority adults

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ABSTRACT

Background and purpose: Chronic diseases such as heart disease, type 2 diabetes, and obesity disproportionately affect minority adults, including African Americans. Engaging in lifestyle changes such as improving dietary habits and increasing physical activity can decrease the incidence and severity of these chronic diseases. The purpose of this research study is to explore the impact of a nutrition education program on health behaviors, lifestyle barriers, emotional eating, and body mass index (BMI) in a community-based setting with a minority sample.

Methods: A convenience sample of 47 primarily African American adults participated in two similar Full Plate Diet nutrition interventions for 6 weeks (group I) and 8 weeks (group II). Participants completed pre-assessment and post-assessment of fruit, vegetable, and fat intake, as well as pre-assessment and post-assessment on physical activity, healthy lifestyle barriers, emotional eating, and BMI.

Conclusions: After intervention, there was a significant increase in intake of fruits and vegetables and decreased fat intake. No significant differences were found in physical activity, healthy lifestyle barriers, emotional eating, or BMI after the intervention.

Implications for practice: A structured, community-based nutrition education program may result in improved dietary habits among African Americans.

Keywords: African American; barriers; dietary habits; fiber; minority; nutrition education; physical activity.

Introduction

Lifestyle-related chronic diseases such as heart disease, type 2 diabetes, overweight, and obesity affect nearly half of all American adults (US Department of Health and Human Services & US Department of Agriculture, 2015). Engaging in lifestyle changes such as improving dietary habits and increasing physical activity can decrease the incidence and severity of these chronic diseases (USDHHS & USDA, 2015). Heart disease is the leading cause of death for all ethnic groups, resulting in the deaths of one in four individuals (Centers for Disease Control and Prevention, 2017a). Diabetes is the seventh leading cause of death in the United States, affecting over 9% percent of the US population in 2015 (Centers for Disease Control and Prevention, 2017b). More than two of three adults are overweight or obese with greater than one-third of adults now being obese (Flegal, Carroll, Kit, & Ogden, 2012).

The US Dietary Guidelines committee recommends that Americans consume more fruits and vegetables, decrease fat intake, and increase physical activity to decrease the risk of lifestyle-related chronic diseases (USDHHS & USDA, 2015). In 2015, only about 12% of American adults consumed the recommended daily amounts of fruit (1.5–2 cups) and about 9% consumed the recommended daily amount of vegetables (2–3 cups) (Lee-Kwan, Moore, Blanck, Harris, & Galuska, 2017). In addition to poor nutritional choices, in 2016, only 51.7% of adults followed the 2008 federal physical activity guidelines to participate weekly in 150 minutes of moderate-intensity physical activity for optimum health benefits (Clark, Norris, & Schiller, 2017).

Fruits and vegetables are two common sources of dietary fiber. However, dietary fiber is also found in seeds, nuts, and whole grains. Higher dietary intake of fiber is
associated with decreased risk of heart disease, better control and prevention of type 2 diabetes, and improved control of body weight (Chen & Tseng, 2010; Kaczmarczyk, Miller, & Freund, 2012; Kendall, Esfahani, & Jenkins, 2010). Despite growing interest among the US public and health care providers that dietary fiber is a key component of a healthy diet, most Americans consume about 15 grams/day, less than the recommended 25 grams/day for adult women and 38 grams/day for adult men (American Dietetic Association, 2008).

Chronic diseases such as heart disease (Graham, 2015), type 2 diabetes (CDC, 2017b), overweight, and obesity (Ogden, Carroll, Kit, & Flegal, 2014) disproportionately affect minority adults, including African Americans. Approximately 50% of all African Americans have some form of heart disease (Benjamin et al., 2017). African Americans are more likely to be diagnosed with diabetes as compared to non-Hispanic whites (12.7% vs. 7.4%) (CDC, 2017b). African Americans also have a higher incidence of obesity compared with non-Hispanic whites (46.8% vs. 37.9%) (Hales, Carroll, Fryar, & Ogden, 2017).

There are individual, social, and environmental barriers to healthy eating among African Americans (Baruth, Sharpe, Parra-Medina, & Wilcox, 2014). Individual barriers include a lack of knowledge about what to eat and how to prepare healthy meals, food addictions, and eating for comfort (Baruth et al., 2014). African American women have described feeling pressured to eat, particularly at social gatherings where healthy eating is discouraged because of cultural food preferences (Baruth et al., 2014). Environmental factors that inhibit healthy eating include the perceived higher cost of healthier food options as compared to lower cost unhealthier food options (Baruth et al., 2014). In addition, another environmental barrier can be a disproportionate lack of access to healthy foods (including fruits and vegetables) in predominately minority communities (Carter et al., 2016; Haynes-Maslow, Parsons, Wheeler, & Leone, 2013).

In addition to barriers to improving eating habits, evidence exists that emotions also affect eating habits (Schlundt, Hargreaves, & Buchowski, 2003). Emotional eating is the habit of consuming food to deal with undesirable emotions, such as stress (Baruth et al., 2014; Doğan, Tekin, & Katrancıoğlu, 2011). African Americans with perceived stress were more likely to eat for comfort and did not adequately prepare for meals (Baruth et al., 2014; Sims et al., 2008). Chronic stress tends to be associated with a preference for eating foods high in fat and sugar, along with a stronger urge to consume food in general (Groesz et al., 2012; Torres & Nowson, 2007). The potential impact of emotional eating on the overweight or obese underscores the need for interventions geared toward further understanding how emotions affect eating behaviors and the need to decrease the growing trend toward increased lifestyle-related chronic diseases.

Fortunately, community-based nutrition education programs have improved dietary habits in adults (Kimura et al., 2013; Stoutenberg, Stanzilis, & Falcon, 2015). Community-based lifestyle interventions have a positive impact on healthy eating habits, weight loss, and physical activity (Cené et al., 2013; Parikh et al., 2010). Given the correlation between chronic diseases and poor dietary habits among African Americans, it is essential to develop community-based studies to include members of this minority group. There is limited nutrition education research with minority adults in community settings to improve healthy eating (Satia, 2009).

**Purpose**

The purpose of this research was to determine the impact of a nutrition education program on health behaviors (nutrition habits and physical activity), healthy lifestyle barriers, emotional eating, and body mass index (BMI) in a community-based study with a minority sample.

**Conceptual framework**

A modified Motivators and Barriers of Health Behaviors Model was used to guide our study. This model is described in detail in a previous publication (Downes, 2010). This model postulates that individuals practice health behaviors based on a balance between motivators and barriers. In previous studies, poor health behaviors (poor dietary habits and decreased physical activity) are correlated with barriers (Downes, 2010). In this study, we were interested in determining whether a nutrition education program would have an impact on the health barriers and result in improved health behaviors and decreased BMI.

**Methods**

A quasieperimental design was used for this study. All research activity was approved by the Institutional Review Board of Florida Gulf Coast University, Florida, USA. Participants provided written informed consent.

**Sample and setting**

A similar community-based intervention was delivered to two groups (group I and group II) of participants at two distinct time points. Group I participated in 2014, and group II participated in 2015. Group I received the intervention over 6 weeks, and group II received the intervention over 8 weeks. Adults from southwest Florida were recruited from a predominately African American, faith-based organization, and community center. The sessions were held for the first group in a conference room of a local church. For the second group, sessions were held in a multipurpose meeting room at a senior living center.

Participants were included in the study if they 1) spoke English 2) were aged 18 years or older, 3) self-identified as
need for a total of eight weeks. The research team changed the sessions from six to eight weeks for group II because of feedback received from group I participants. The first group expressed that they would have preferred additional sessions for the amount of material delivered.

**Measures**

Predata and postdata were collected for both groups. For groups I and II, at the first and last session, each consenting participant answered questions about demographics, health behaviors, healthy lifestyle barriers, and emotional eating. Weight was obtained at baseline and again at the final session for both groups.

**Demographics.** An investigator-developed demographic measure was used for this study. Participants were asked about their age, sex, ethnicity, marital status, education, living arrangements, and health conditions.

**Health behaviors.** Nutrition habits and physical activity were assessed using established criteria from government guidelines for intake of fruits, vegetables, fats (USDA & USDHHS, 2010), and physical activity (Physical Activity Guidelines Advisory Committee, 2008). In this study, nutrition habits were measured by three yes/no questions regarding intake of fruit, vegetable, and high-fat foods: 1) “Do you eat 2 cups of fruits per day?” 2) “Do you eat 2.5 cups of vegetables per day?” and 3) “Do you avoid high-fat–high-calorie foods, such as potato chips, soda or high-fat meat, most of the time?” Physical activity was measured using a yes/no question: “Do you participate in moderate physical activity such as jogging, biking, walking, or swimming 30 min 5–7 days of the week?”

**Healthy lifestyle barriers.** The Barriers subscale (Downes, 2010) was used to assess healthy lifestyle barriers of health behaviors. The Barriers subscale reliability was demonstrated in a previous study with Cronbach’s alpha of 0.90 (Downes, 2010). The Barriers scale used a 4-point Likert scale (1 = strongly disagree to 4 = strongly agree).

<table>
<thead>
<tr>
<th>Table 1. Session topics</th>
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</thead>
<tbody>
<tr>
<td><strong>Sessions #</strong></td>
</tr>
<tr>
<td>Session 1</td>
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<tr>
<td>Session 2</td>
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<td>Session 3</td>
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<td>Session 4</td>
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<td>Session 6</td>
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<td>Session 7</td>
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<td>Session 8</td>
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</tbody>
</table>

The exclusion criteria were determined by asking the participants whether 1) they were interested in participating in a program to help them lose weight and 2) they had a desire to eat a healthy diet with an emphasis on plant-based foods. If they answered no to either of these questions, they were excluded from the study.

**Study intervention**

We used an established nutrition program (Full Plate Diet) to determine the impact of a 6-week (group I) or an 8-week (group II) intervention on health behaviors (fruit, vegetable, fat intake, and physical activity), healthy lifestyle barriers, emotional eating, and BMI in primarily minority adults. The Full Plate Diet program is an evidence-based nutrition program focused on the concept that eating high-fiber foods, such as fruits and vegetables, will increase satiety, increase intake of nutrient-rich foods, and decrease intake of calories, which can contribute to a decrease in weight and result in better health outcomes (Seale, Sherard, & Fleming, 2010). There are eight topics covered in the Full Plate Diet program, each designed to be presented in a session lasting approximately 60 minutes. The eight topics addressed the following: 1) “Are you eating enough to lose weight?” 2) “Can all fiber-rich foods help you lose weight?” 3) meal makeovers, 4) it is more than just food, 5) making the most of mornings, 6) smart grocery shopping, 7) restaurants: a dieter’s dilemma, and 8) rev up weight loss (Table 1).

To the best of the principal investigator’s knowledge, and through communication with the Chief Executive Officer and President of the Full Plate Living team, this program has not been tested in a community-based minority sample study (K. Brown, 2017, personal communication). The intervention was a scripted interactive program with a facilitator’s manual and a participant’s manual developed by Seale et al. (2010). This program was delivered by an interdisciplinary team of three facilitators including a nurse practitioner and a social worker with doctoral degrees, and a nurse practitioner student. The nurse practitioner was the Principal Investigator, the social worker was a Co-Investigator, and the student was a Graduate Research Assistant who facilitated data collection. All three team members took part in leading group sessions.

In group I, weekly programs were held for a total of six weeks. Eight topics were presented over six weekly sessions. The researchers collapsed the design from eight weeks to six weeks to reduce participant burden. The following topics were combined in week two: 1) “Can all fiber-rich foods help you lose weight?” and 2) “meal makeovers.” The following topics were combined in week three: 1) “it is more than just food” and 2) “making the most of mornings.” In group II, weekly programs were held for a total of eight weeks. The research team changed the sessions from six to eight weeks for group II because of feedback received from group I participants. The first group expressed that they would have preferred additional sessions for the amount of material delivered.
agree) and had 10 items with the leading statement: “I do not practice a healthy lifestyle because I …” and included responses related to busyness, health problems, lack of knowledge, cost, and feeling stressed. A summative score was derived by adding the 10 items of the Barriers scale.

**Emotional eating.** The Eating Behavior Patterns Questionnaire (EBPQ) (Schlundt et al., 2003) includes a 10-item subscale for emotional eating on a five-point Likert scale (1 = strongly disagree to 5 = strongly agree). The coefficient alpha for this subscale, tested with African Americans, was 0.80 (Schlundt et al., 2003). Items on the EBPQ included content about how emotions affected eating, such as, “my emotions affect what and how much I eat.” A summative score was derived by adding the 10 items of the eating behaviors scale.

**Body mass index.** Body mass index was calculated by entering weight and height into the National Heart, Lung, Blood Institute (National Heart, Lung, Blood Institute, n.d.a.) online BMI calculator. Weight was obtained with a Weight Watchers digital glass scale, model WW337 by Conair and measured to the nearest 0.5 pound, and height was self-reported to the nearest inch.

**Interview guide.** For group I, two months after the completion of the study, a nurse practitioner student followed up with participants by telephone. Using a scripted interview guide, she asked questions related to the program (Table 2).

### Analyses

**Statistical analyses.** Differences between groups I and II were analyzed using a t test and chi-squared tests. The effect of the intervention on the outcome variables was analyzed using chi-squared tests, binomial permutation tests, and paired sample t-tests. Descriptive and bivariate statistical analyses for all the data were performed using Statistical Package for Social Sciences (SPSS; Version 2013) and R (Version 3.2.2) (R Core Team, 2015).

**Qualitative analysis.** Qualitative data were descriptively analyzed by counting the number of responses to each question asked in the interviews, using the methodology of content analysis by Krippendorf (2004). In addition, qualitative data were used to determine the effectiveness of the intervention (Polit & Beck, 2017). The qualitative data were meant to inform the current study findings and were not intended to be viewed in a context separate from the quantitative results.

### Results

**Characteristics of participants**

The pretest sample of the combined group I and group II included 47 adults with a mean age of 67 (SD = 11) years, with the majority being female (n = 31/47, 74%) and self-identifying as black or African American (n = 27/47, 64%). Most participants did not have any college education (n = 23/47, 55%). Ninety-one percent (n = 41) had one or more chronic diseases, most commonly hypertension and diabetes. Participants had a mean BMI of 32.8 (SD = 8.6). Significant differences were noted between the baseline characteristics of Group I and Group II on age, marital status, and living arrangements (Table 3). Of the 47 participants who started the study, 8 of 20 in group I and 14 of 27 in group II completed the presurvey and postsurvey. In group I, an average of 16 of the 20 participants attended each session. In group II, an average of 12 of the 27 participants attended each session.

**Effects of the intervention on health behaviors**

There was a significant difference in fruit and vegetable intake but not physical activity, after the intervention. An increased proportion of participants self-reported eating more fruits and vegetables (Table 4).

**Barriers and emotional eating outcomes**

Barriers scale responses were condensed into two categories (agree/strongly agree and disagree/strongly disagree). Although there was a trend toward a decrease in barriers (premean = 23.95 [SD = 2.81] to postmean = 23.04 [SD = 3.67]) and emotional eating scores (premean = 28.63 [SD = 9.29] to postmean = 26.98 [SD = 9.12]) after the intervention, the differences were not significant. Health problems were the most frequently identified barrier both before intervention (65% [25/38]) and after intervention (54.6% [12/22]).

**Body mass index**

There was no significant change between the baseline BMI (M = 32.80 [SD = 8.63]) and the postintervention BMI (M = 32.88 [SD = 9.53]). Baseline data indicated a correlation between BMI and health barriers. Participants with higher BMI levels were more likely to have higher health barrier
and emotional eating scores. A Wilcoxon signed-rank test showed the nutrition education intervention treatment did not elicit a statistically significant change in BMI ($Z = -0.142, p = .88$).

**Interview data interpretation**

Interview data were collected through telephone interviews. Of the 20 participants in group I, one participant declined to answer the questions and 6 participants could not be reached after three calls, resulting in 13 (65%) that agreed to answer the questions over the telephone.

All the participants reported making changes because of the Full Plate Diet program. Most participants felt they had support to practice their health behaviors ($n = 8/13$). Most participants also weighed themselves at least once a week ($n = 8/13$). Most participants ($n = 12/13$) reported some weight loss at the end of the 6-week nutrition education program, ranging from 2 to 10 pounds. Most participants ($n = 7/13$) were regularly participating in physical activity with walking cited as the most common

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group 1 ($n = 20$)</th>
<th>Group 2 ($n = 27$)</th>
<th>$p$-Value for t test or Chi-Squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years) M (SD)</td>
<td>55 ± 12</td>
<td>72 ± 6</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>Sex, $n$ (%)</td>
<td></td>
<td>NS</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>3 (15)</td>
<td>7 (26)</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>17 (85)</td>
<td>18 (67)</td>
<td></td>
</tr>
<tr>
<td>Ethnicity, $n$ (%)</td>
<td></td>
<td>NS</td>
<td></td>
</tr>
<tr>
<td>Black/African American</td>
<td>15 (75)</td>
<td>16 (59)</td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>1 (5)</td>
<td>4 (15)</td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td>2 (10)</td>
<td>4 (15.4)</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>2 (10)</td>
<td>1 (3)</td>
<td></td>
</tr>
<tr>
<td>Marital status, $n$ (%)</td>
<td></td>
<td>&lt;.01</td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>4 (20)</td>
<td>11 (41)</td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>13 (65)</td>
<td>3 (11)</td>
<td></td>
</tr>
<tr>
<td>Divorced/separated</td>
<td>0 (0)</td>
<td>8 (30)</td>
<td></td>
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<tr>
<td>Widowed</td>
<td>0 (0)</td>
<td>4 (15)</td>
<td></td>
</tr>
<tr>
<td>Education, $n$ (%)</td>
<td></td>
<td>NS</td>
<td></td>
</tr>
<tr>
<td>Elementary—high school graduate</td>
<td>7 (35)</td>
<td>18 (67)</td>
<td></td>
</tr>
<tr>
<td>Some college—Associate degree</td>
<td>9 (45)</td>
<td>5 (19)</td>
<td></td>
</tr>
<tr>
<td>Bachelor’s—graduate degrees</td>
<td>4 (20)</td>
<td>3 (11)</td>
<td></td>
</tr>
<tr>
<td>Living arrangements $n$ (%)</td>
<td></td>
<td>&lt;0.01</td>
<td></td>
</tr>
<tr>
<td>Alone</td>
<td>1 (5)</td>
<td>21 (78)</td>
<td></td>
</tr>
<tr>
<td>Not Alone</td>
<td>16 (80)</td>
<td>4 (15)</td>
<td></td>
</tr>
<tr>
<td>Missing</td>
<td>3 (15)</td>
<td>1 (7)</td>
<td></td>
</tr>
<tr>
<td>Body mass index (kg/m$^2$) M (SD)</td>
<td>34 ± 7.5</td>
<td>32 ± 9</td>
<td>NS</td>
</tr>
<tr>
<td>$&lt;25$ n (%)</td>
<td>0</td>
<td>5 (19%)</td>
<td></td>
</tr>
<tr>
<td>25–29.9</td>
<td>11 (55)</td>
<td>8 (29)</td>
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<tr>
<td>&gt;30</td>
<td>9 (45)</td>
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<td></td>
<td>4</td>
<td></td>
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</tbody>
</table>

Note: NS = not significant.
type of physical activity. In response to the question "What part of the program are you still following?" the responses included: "Oatmeal for breakfast, [I] changed from instant oatmeal to regular oatmeal, adding more fiber" and another participant stated "adding fiber, beans, [and] brown rice." All the participants responded that they would recommend the program to a friend or family member. Overall, participants responded favorably to their participation in the program.

Discussion
This is the first published study, to our knowledge, to implement the Full Plate Diet nutrition education program in a sample of community-dwelling minority adults. The study implemented an evidence-based nutrition education program in a sample of community-dwelling minority adults who were predominantly older, of lower socioeconomic status, and obese. The educational program resulted in more participants eating fruits and vegetables daily and decreasing their fat intake. There was also a trend toward decreased healthy lifestyle barriers and emotional eating. However, no changes were noted in BMI or physical activity after intervention.

In this study, we found that participants increased intake of fruits (35%) and vegetables, (28%) and decreased intake of fatty foods (22%). This is an important finding because eating a diet-rich in fruit and vegetables and avoiding unhealthy foods decreases the incidences of chronic diseases (USDHHS & USDA, 2015). Results of a study to improve cardiovascular health in urban community-dwelling adults identified that a participatory approach significantly increased fruit intake but not vegetable intake due to lack of access to vegetables in predominantly minority communities (Carter et al., 2016; Haynes-Maslow et al., 2013). After the completion of the educational program, participants reported during the postintervention interviews in group I that they made positive changes to dietary habits. Previous community-based intervention study results support the findings of this nutrition education study. In one community-based study of older racially diverse adults, the researchers found that, after a 12-week group behavioral intervention, there was a significant increase in healthy dietary habits, including increased fruits and vegetables (Turk, Elci, Resick, & Kalarchian, 2016).

There have been varied results of changes in fat intake after lifestyle intervention programs. Amundson et al. (2009) reported a significant decrease in fat intake of persons at high risk for diabetes and cardiovascular disease at the end of the 16-week intervention period. Similarly, our nutrition education program results indicated a decrease in fat intake at the end of the intervention period, but the findings were not statistically significant. Conversely, significant differences were not found for decreased fat intake in other community-based intervention studies (Parikh et al., 2010; Ruggiero, Oros, & Choi, 2011).

Older adults and African Americans in particular face many barriers to practicing healthy lifestyle behaviors. In this study, the most common barrier to practicing a healthy lifestyle was health problems, with most participants having one or more chronic conditions such as hypertension and diabetes. These health barriers may have contributed to group II attending on average fewer

<table>
<thead>
<tr>
<th>Variable</th>
<th>Yes</th>
<th>No</th>
<th>Proportion of Yes Responses</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eating fruits (n = 20)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>4</td>
<td>16</td>
<td>0.20</td>
<td>&lt;.01*</td>
</tr>
<tr>
<td>Post</td>
<td>11</td>
<td>9</td>
<td>0.55</td>
<td></td>
</tr>
<tr>
<td>Eating vegetables (n = 18)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>8</td>
<td>10</td>
<td>0.44</td>
<td>&lt;.01*</td>
</tr>
<tr>
<td>Post</td>
<td>13</td>
<td>5</td>
<td>0.72</td>
<td></td>
</tr>
<tr>
<td>Avoiding fatty foods (n = 18)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>10</td>
<td>8</td>
<td>0.56</td>
<td>.01</td>
</tr>
<tr>
<td>Post</td>
<td>14</td>
<td>4</td>
<td>0.78</td>
<td></td>
</tr>
<tr>
<td>Physical activity (n = 19)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>10</td>
<td>9</td>
<td>0.53</td>
<td>NS</td>
</tr>
<tr>
<td>Post</td>
<td>9</td>
<td>10</td>
<td>0.47</td>
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</tr>
</tbody>
</table>

Note: NS = not significant.
sessions than group I (which was significantly younger). Nicklett and Kadell (2013) identified predictors and barriers to fruit and vegetable intake among older adults. They determined that older adults consume fewer fruits and vegetables because of declining health status, socioeconomic status, and dietary knowledge (among other factors) (Nicklett & Kadell, 2013). Similarly, our sample of primarily African Americans of lower socioeconomic status tended to score higher on barriers, which included the affordability and availability of resources that promote healthy lifestyle behaviors (Downes, 2010).

Minority individuals faced with chronic stress may be more likely to eat due to emotions (Nguyen-Rodriguez, Chou, Unger, & Spruijt-Metz, 2008). In the current study, emotional eating scores decreased after the intervention, but the decrease was not statistically significant. However, the results are consistent with other studies that identified higher BMI results with higher emotional eating scores (Sims et al., 2008). Although BMI and emotional eating were not significantly changed after the intervention, future studies with a larger sample should explore the impact of the nutrition intervention on emotional eating. Health care providers should consider assessing emotional eating behaviors in addition to motivators and barriers to positive health behaviors as contributing factors to lifestyle-related chronic diseases. The US Physical Activity Guidelines (2008) recommend that older adults obtain at least 150 minutes of moderate-intensity physical activity weekly. In our study, participants did not have a significant change in physical activity after intervention. However, this finding was not supported by the qualitative data, as a majority of individuals interviewed after the completion of the intervention for group I reported increased walking. Walking as a main form of physical activity continues to be supported by the US Surgeon General as an excellent and realistic activity in which to participate (USDHHS, 2015). The dichotomy in the physical activity results between the quantitative findings and the findings from the interviews may be attributed to the small sample size.

Lessons learned from this nutrition education program will be considered in the development of a larger study. Providing adequate time for participants to complete presurvey and postsurvey and thoroughly checking those surveys for completeness will be implemented in future studies. Additional strategies will be used to increase retention in the study, specifically for individuals that may be at more risk to not complete the study. Increased staff will be allocated to obtain assessment data for participants who have poorer health, lower socioeconomic status, and had decreased participation in the sessions (Buchholz et al., 2016). We will also provide up to three calls for reminders of all assessment appointments because this strategy has been successfully used with a minority sample (Wilbur et al., 2013). Based on the qualitative feedback of the participants in the 6-week intervention and the perception of the researchers, delivering the intervention in 6 weeks was considered too short of a period. Therefore, after the initial baseline assessment is completed, in the future, the program will be implemented over 8 weeks followed by a post-intervention assessment period.

Limitations
Several study limitations exist and include design restrictions such as a lack of a comparison group, which limits the ability to determine the effects of the intervention. It is possible that outcomes between groups may have been affected because of the differences in number of sessions (six for group I and eight for group II). Also, the smaller sample size may have contributed to the inability to detect change related to the intervention. A larger post-test response rate is needed to demonstrate clinical effects of the intervention more conclusively. Other limitations included potential sensitivity in adults about discussing their weight, which may have contributed to lack of or incomplete responses, as well as individuals who may not have estimated their height correctly, therefore resulting in inaccurate BMI calculations.

In addition, caution should be exercised when the results are interpreted because of group differences. Although the groups were of similar ethnic background and sex and shared similar eating and physical activity habits before intervention, there were differences in baseline characteristics related to age, marital status, and living arrangements, which may have affected the outcomes of the study. Future studies would benefit from the consideration of a homogeneous sample to limit the variability of result interpretation.

In the future, we intend to take steps to improve questionnaire completion, including assessing literacy levels initially and carefully checking survey completion. However, the positive findings provide foundational knowledge supporting the need to further test the intervention with a larger sample and longitudinal data. Qualitative findings should only be viewed in the context of this study because they were supplemental to the quantitative work. Participants were interviewed to increase data available for determining the interpretation of findings (Polit & Beck, 2017).

Implications for Practice
Nutrition education is relevant to the management of leading chronic diseases such as heart disease, type 2 diabetes, overweight, and obesity. Providers may implement the program within practice settings in group nutrition classes or in the community using the evidence-based Full Plate Diet program. In addition, the Full Plate Diet program is offered/available online at the Full
Plate Living website; providers may refer patients to this valuable resource to improve eating habits and health outcomes, providing a supplement to medication management of chronic diseases. In this study, the Full Plate Diet nutrition intervention has demonstrated an increase in fruit and vegetable intake. There is evidence to support that an increased intake of fiber-rich foods such as fruits and vegetables may improve cardiovascular health, type 2 diabetes, and weight management. Therefore, nurse practitioners should consider adding the Full Plate Diet program to their toolbox to help educate patients to improve nutrition habits.

Conclusions
This study demonstrated that the Full Plate Diet program (Seale et al., 2010) nutrition education study could be implemented in a community-based setting with a sample of minority adults. Lessons learned from this study will be included in a larger study. More detailed attention will be given to data collection strategies to improve the quality of the data. Our findings suggest that the intervention can effectively improve nutrition intake in a sample of overweight/obese minority adults.

Community-based nutrition education programs are warranted to stem the projected increase in lifestyle-related chronic diseases in adults.

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References

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