

Examining the Effectiveness of a Nutrition Education Intervention for Hispanic Participants

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ABSTRACT

Background: The Expanded Food and Nutrition Education Program (EFNEP) *Food Talk* nutrition education curriculum in the state of Georgia was specifically tailored towards Hispanic EFNEP participants in order to test the effectiveness of the intervention in the Hispanic population.

Methods: 455 Hispanic EFNEP individuals ages 18-61 in the state of Georgia participated in the data collection. Measures collected include 24 hour diet recall, and food behavior checklist to compare consumption and food behavior practices both before and after nutrition education intervention.

Results: Measurable objectives of the study include statistically significant increases ($p < .001$) in fruit, vegetable and milk consumption and consumption of fruits, vegetables and milk group foods closer to the recommended levels of USDA MyPlate guidelines for the nutrition education intervention group. Results also showed statistically significant ($p < .0001$) improvements in nutrition-related behaviors.

Conclusions: This study supports a nutrition intervention developed to improve dietary behaviors for EFNEP participants that will be effective in the Hispanic population of Georgia with modifications to the nutrition education curriculum.

Keywords: EFNEP, nutrition education, Hispanic

INTRODUCTION

Over the past 30 years, the percentage of people consuming the recommended “five a day” fruits and vegetable servings increased by only 4%. In 1980, approximately 9% of United States (US) residents consumed three servings of vegetables and two servings of fruits a day. About 13 % of adults in the U.S. consumed the adequate five servings a day in 2015 (Lee et al., 2017). Hispanics are the fastest growing segment of the total population, and make up a large percentage (18.3%) of the U.S. population (US Census Bureau, 2019). Dietary intakes of minorities, including Hispanics, are also inconsistent with the national goals.

Georgia is one of the ten states with the largest increase in the Hispanic population in recent years (Brown et al., 2013). In 2015, 74.8% of Hispanics in Georgia consumed less than five fruits and vegetables per day (Lee et al., 2017). Currently Hispanics, as well as other ethnic groups, are affected by the obesity epidemic, which is seen by an overweight and obesity prevalence of 50.6% in Mexican-American women as compared to 47.0% in the

general female population (CDC, 2017). Furthermore, from 2005 to 2014, Mexican-American women were 30% more likely to be overweight compared to non-Hispanic whites (Flegal et al., 2016). Existing research recommends that dietitians and health care professionals encourage Hispanics to maintain healthy eating habits regarding fruit and vegetable consumption while adjusting to a new culture (Neuhouser et al., 2004; Cuy Castellanos, 2015, Yoshida et al., 2018). Recent studies examined the effects of culturally appropriate intervention programs for Hispanic families and suggest that further research and intervention studies are necessary (Cown et al., 2017). Lower socio-economic and minority populations may not have access to traditional healthcare due to limitations such as language barriers, lack of access to media (internet), health insurance, transportation, and wellness programs. As a result, national strategies to increase consumption of fruits and vegetables and reduce health disparities may not reach these at-risk populations (O’Mara-Eves et al., 2015). Because of these

limitations, it is important to develop nutrition interventions tailored to this group.

This research contributed towards existing gaps of whether an evidence based nutrition curriculum known as Food Talk and developed for limited resource families in Georgia who participated in the federally funded Expanded Food and Nutrition Education Program (EFNEP) would also be effective in the Hispanic population. Researchers aimed to address benefits of, barriers to, and self-efficacy of a nutrition intervention designed to align with the teachings of the Dietary Guidelines for Americans and the DASH (Dietary Approaches to Stop Hypertension) diet eating pattern. Faculty and staff at The University of Georgia developed the nutrition education curriculum, Food Talk, which resulted in an increase in the consumption of fruits, vegetables, and milk group foods among EFNEP participants in Georgia. This curriculum is innovative because it consists of experiential and dialogue-based learning and explores the barriers as to why certain dietary behaviors are not practiced. It also discussed potential tools to overcome these practices.

The overall goal of this study was to pilot the evidence based Food Talk curriculum as a nutrition intervention in Hispanic communities in two Georgia counties: Gwinnett County (urban) and Clarke County (more rural). These data would inform the development of a culturally appropriate Spanish version of the Food Talk EFNEP curriculum. In addition, this study demonstrates a collaborative approach to research that engaged with the University of Georgia (UGA) Department of Foods and Nutrition, UGA Family and Consumer Sciences Cooperative Extension, County Extension Agents, Nutrition Peer Educators and community partners in urban and rural communities in Georgia. It was hypothesized that this nutrition intervention would be effective in the EFNEP Hispanic population of Georgia. The specific aims were to: 1) Increase nutrition practices important to consuming a healthy diet including reading nutrition labels, planning meals ahead of time, and thinking about healthy food choices, 2) Increase the consumption of fruits, vegetables, and milk food groups, and 3) Decrease consumption of sodium and fat and increase consumption of fiber and vitamins A and C. The success of these outcomes would then lay the foundation for the development of a Spanish version of the Food Talk EFNEP Curriculum that could be delivered to Hispanic communities across Georgia.

Curriculum for Intervention

The University of Georgia EFNEP curriculum entitled Food Talk was the nutrition education curriculum used in the intervention. It was developed by Gail Mooney Hanula (Hanula et al., 2008) and is based on the Health Belief Model (HBM). The curriculum emphasized the constructs of the HBM, including the benefits of and barriers to consuming a diet high in fruits, vegetables, and low-fat dairy products, as well as one's confidence in one's ability

to perform certain diet-related behaviors (self-efficacy) (Jones et al., 2015). The curriculum was not developed specifically for Hispanics and mainly targets the African-American population, as roughly 70% of EFNEP participants in Georgia are African-American (Hanula et al., 2009). Food Talk was delivered in a series with a one hour session each week for six weeks and incorporated low-literacy graphics, stories, and visuals to account for participants who were unable to read or write. Furthermore, group activities, with minimal writing, or where the groups chose a person to be the speaker and captain, aided in making the sessions collaborative and interactive. Food Talk sessions also included the preparation of low-cost recipes that utilized low-cost ingredients most accessible to EFNEP participants. Food demonstrations were a critical part of the curriculum and each session to enhance self-efficacy and to make the participants feel empowered to reproduce the recipe at home. Participants were also encouraged to taste these recipes while participating in each session. If the participants attended all the sessions, they received a certificate of completion. If the participants did not receive the certificate of completion due to missed sessions, they were informed they could finish the program by attending the sessions needed in a future EFNEP program. For this study, data were collected for all EFNEP participants in Georgia who identified as Hispanic.

The intervention nutrition education group, who were Hispanic EFNEP participants in Gwinnett and Clarke counties in Georgia, received the Food Talk EFNEP sessions described above. However, an interdisciplinary approach was utilized in that the program was delivered in English by the EFNEP Program Assistant (UGA Extension Peer Educator) and also with the help of a Spanish speaking translator in each session. This translator was a UGA graduate student who was fluent in speaking Spanish. Minor changes were also made to the curriculum to enhance the appeal to Hispanic participants. For instance, food and drink examples that would be better known by the Hispanic population were used in place of items more commonly consumed by traditional Georgia EFNEP participants (e.g., tamarind juice and horchata beverage instead of sugar sweetened beverages like sweet tea). In addition, characters used within the story-telling aspects of the curriculum were changed to identify more with Hispanic culture. The actual content of the lessons and recipes was not altered.

METHODS

The study was an evaluation of a community nutrition education program in the state of Georgia (EFNEP). All methods were approved by the University of Georgia (UGA) Institutional Review Board. Data for EFNEP participants who identified as Hispanic were collected across the State of Georgia. These participants received the Food Talk curriculum, delivered in English and by nutrition peer educators (Program Assistants). During this same timeframe, Hispanic individuals who met the criteria for

participation in EFNEP for the counties of Clarke and Gwinnett in the state of Georgia were recruited for the nutrition intervention group of this study. The criteria for participation in EFNEP include being a caregiver of at least one child, or being a pregnant teen/woman, and income at or below 185% of the current poverty line and eligible for assistance programs (i.e. SNAP, HeadStart, TANF/FIP, WIC). They received the same Food Talk curriculum and with the modifications described in the “Curriculum” Section outlined above. UGA Cooperative Extension faculty and staff, Clarke and Gwinnett County Extension personnel, and Casa de la Amistad, which provides Hispanics with social services, referrals, translations, education, and advocacy, aided in the recruitment of the participants. The participants were contacted on a weekly basis in order to remind them of the time and day of the lessons. The lessons were open to all EFNEP clients; however, the inclusion criterion for data analysis was limited to Hispanic women 18 years and older who met the general criteria for participation in EFNEP as described above. Women were primarily targeted for the intervention, as they are typically in charge of food preparation and make most of the food-related decisions (Eakin et al., 2007; Villegas et al., 2018). All interested individuals were given an oral description of the study, including procedures, requirements to graduate from the EFNEP program, and benefits of the study. The participants were informed of the right to withdraw from the study with no penalty to the services they receive from EFNEP or Casa de la Amistad. For the nutrition education intervention, thirty five participants were targeted. Furthermore, it was communicated that they did not have to provide any personal information they did not wish to give, nor did they have to complete the food behavior checklist and/or 24-hour diet recall to remain in the program.

The design was a one-group repeated measure (pre- and post t-test). The groups received sessions once a week for one hour per session, and the intervention lasted for six continuous weeks. In the first session, participants completed the baseline evaluation, which included the EFNEP entry form, the 24-hour diet recall, and the food behavior checklist. Post-intervention data was collected at week six. All data were self-reported. The EFNEP entry form questioned participants about their demographic information, including age, number and age of children, number of household members, ethnicity, government assistance, and pregnancy and breastfeeding status. The EFNEP exit form questioned participants about their monthly income, their thoughts on the program, as well as the demographic and familial information they provided in the entry form. The 24-hour diet recall, the entry and exit form, the food behavior checklist, the “Food Talk” curriculum, and materials from the lessons were utilized as measurement tools for data collection. The 24-hour diet recall measures dietary intake and the respondents recorded the entire food and beverage intake consumed in the past 24

hours of the previous day such as each item eaten, portion sizes, and the number of times the food item was eaten during the previous day. When exploring for accurate portion sizes on the 24-hour diet recall, the paraprofessionals used the USDA 5-step Automated Multiple Pass Method (Raper et al., 2004). The food behavior checklist was used to assess behavioral changes and was divided into 3 parts: food safety, food resource management, and nutrition practices.

Statistical Analysis

Quantitative data collected, including the 24-hour diet recall, enrollment data, and exit data, information was entered into The Nutrition Education Evaluation and Reporting System (NEERS5, version CRS5.1), which was the EFNEP national database and reporting system at the time of this study. Paired t-tests were used to compare the baseline information and the changes in the outcome variables. General descriptive statistics analyses were carried out using PASW (version 18.0) to determine if the changes in the consumption of fruits, vegetables, milk group foods, fiber, vitamins A and C, fat, calcium, sodium, and food behavior checklist results were significant. Other variables calculated include the food behavior checklist and the Healthy Eating Index Score (HEI) for fruits, vegetables, fat, sodium, and overall. The HEI is a tool developed by USDA and is based on a ten-component system composed of five food groups (fruits, vegetables, grains, meats and milk), four nutrients (total fat, saturated fat, sodium, cholesterol) and a measure of variety food intake (HEI USDA, 2019). It measures the degree to which a person’s diet conforms to the servings recommended by MyPlate (CDC, 2019). NEERS5 assigns each participant a HEI number that ranges from 1=very poor to 10= excellent at the beginning of the intervention and after the intervention. The overall (dietary intake) HEI is a value given from 1 to 100 and indicates the overall healthy eating score average of each participant. HEI was analyzed to see if there was a relationship between the increase in fruits and vegetables and a decrease in sodium and fat with each variable’s HEI following the intervention.

RESULTS

All 455 individuals enrolled in the study were EFNEP participants who identified themselves as Hispanic and attended an EFNEP program in Georgia. Of the participants, 429 were enrolled in the EFNEP nutrition education curriculum throughout the state of Georgia (GAEFNEPHispanic). Twenty six participants, who were in the nutrition education intervention, were from two counties in Georgia (Clarke-Gwinnett). All participants were female and the distributions of ages found in the GAEFNEPHispanic and Clarke-Gwinnett groups can be found in Table 1.

Table 1

Distribution of Age, Children, Family Size, Highest Grade Completed and Program Assistance for GAEFNEPHispanic and Clarke-Gwinnett Groups

<i>Description</i>	<i>GAEFNEPHispanic n=429</i>	<i>Clarke-Gwinnett n=26</i>
Age	n (%)	n (%)
20 or below	23 (6)	0 (0)
21-29	121 (28)	4 (15)
30-39	190 (44)	11 (42)
40-49	50 (12)	7 (27)
50-59	21 (5)	0 (0)
Number of Children	n (%)	n (%)
0	34 (8)	2 (8)
1	103 (24)	4 (15)
2	142 (33)	11 (42)
3	92 (21)	3 (12)
4	37 (9)	5 (19)
5	16 (4)	1 (4)
6+	5 (1)	0 (0)
Family size	n (%)	n (%)
1	23 (5)	2 (8)
2	38 (9)	1 (4)
3	81 (19)	4 (15)
4	121 (28)	5 (19)
5	89 (21)	4 (15)
6	47 (11)	7 (27)
7	18 (4)	1 (4)
8+	12 (3)	2 (8)
Highest grade completed	n (%)	n (%)
Did Not Answer	162 (38)	19 (73%)
Grade 6 or less	54 (13)	1 (4)
Grade 7	5 (1)	0 (0)
Grade 8	8 (2)	1 (4)
Grade 9	32 (7)	3 (12)
Grade 10	8 (2)	0 (0)
Grade 11	12 (3)	1 (4)
Grade 12 or GED	86 (20)	0 (0)
Some college	28 (7)	0 (0)
Graduated 2 year college	13 (3)	1 (4)
Graduated College	21 (5)	0 (0)
Post-Graduate	0 (0)	0 (0)
Program Assistance	n (%)	n (%)
Child Nutrition	179 (42)	16 (62)
Food Stamps	131 (31)	5 (19)
WIC	108 (25)	4 (15)
Other	60 (14)	0 (0)

Most of the women in both groups did not report household income, and education levels were comparable for both

groups. The percent of Clarke-Gwinnett participants who participated in the Child Nutrition program (free or reduced

school meals) was 62%, Supplemental Nutrition Assistance Program (SNAP) 19%, and WIC 15%. Seventy three percent of Clarke-Gwinnett participants were enrolled in one or more food assistance programs at the beginning of the intervention. Forty two percent of GAEFNEPHispanic participants indicated that they received Child Nutrition, 31% received SNAP and 25% were enrolled in WIC at baseline.

24-Hour Diet Recall Results

Data indicates improvements in fruit, vegetable, and milk group food consumption as well as increases in fiber and vitamin A and C were seen and can be found in Table 2.

Table 2

Clarke-Gwinnett and GAEFNEPHispanic Nutrient Increases at Pre-Intervention and Post-Intervention

Nutrient amount per day	Clarke-Gwinnett (n = 26)			GAEFNEPHispanic (n = 429)		
	Pre-test n=26 Mean ± SD	Post-test n=26 Mean ± SD	P value	Pre-test n=429 Mean ± SD	Post-test n=429 Mean ± SD	P value
Fruit servings (c)	0.5 ± 0.5	0.7 ± 0.7	NS	0.6 ± 0.8	1.7 ± 1.5	<0.001*
Vegetable servings (c)	0.8 ± 0.6	1.6 ± 0.8	<0.001*	1.2 ± 1.2	1.9 ± 1.5	<0.001*
Milk group servings (c)	1.0 ± 0.9	1.6 ± 1.5	NS	1.0 ± 1.1	1.7 ± 1.2	<0.001*
Vitamin A (IU)	3600 ± 1744	5568 ± 3416	0.019*	4912 ± 891	8056 ± 12776	^b N/A
Vitamin C (mg)	34.5 ± 40	62.5 ± 47	0.034*	52 ± 63	93 ± 99	^b N/A
Sodium (mg)	2376 ± 904	2199 ± 631	NS	2469 ± 1460	2754 ± 1397	^b N/A
Fiber (g)	9.7 ± 5.8	14.7 ± 6.4	<0.001*	14 ± 11	21 ± 11.1	^b N/A
Fat (g)	44.8 ± 21.1	32.8 ± 13.6	0.033*	52.6 ± 33.6	59.8 ± 32.1	^b N/A
Calories	1175 ± 394	1090 ± 349	NS	1384 ± 698	1686 ± 684	^b N/A
HEI fruit ^a	2.7 ± 3.0	3.6 ± 3.4	NS	3.6 ± 3.5	6.8 ± 3.8	<0.001*
HEI vegetable ^a	3.1 ± 2.3	6.2 ± 2.4	<0.001*	4.0 ± 3.3	6.1 ± 3.2	<0.001*
HEI sodium ^a	8.4 ± 2.3	9.5 ± 1.1	NS	7.7 ± 3.4	7.4 ± 3.4	NS
HEI fat ^a	6.1 ± 3.6	8.7 ± 2.4	<0.001*	6.5 ± 3.7	7.4 ± 3.3	<0.001*
HEI overall ^a	55.8 ± 14.2	68.4 ± 13.3	<0.001*	57.0 ± 13.6	69.8 ± 13.4	<0.001*

Note. ^aHEI = Healthy Eating Index for each fruit, vegetables, sodium and fat ranges from 1=very poor to 10= excellent. Overall HEI encompasses ten nutrients and ranges from 1 = very poor to 100= excellent

^bN/A indicates data could not be calculated for statistical significance due to inaccessibility of records from Georgia counties.

GAEFNEPHispanic showed significant increases (P <.0001) in fruits, vegetables, and milk group foods. Fruit consumption increased from 0.6 ± 0.8 cups per day to 1.7 ± 1.5 cups per day (P <.0001) and vegetable consumption increased from 1.2 ± 1.2 cups per day to 1.9 ± 1.5 cups per day (P <.0001). Milk consumption increased from 1.0 ± 1.1 cups per day to 1.7 ± 1.2 cups per day (P <.0001). Clarke-Gwinnett vegetable consumption increased from 0.8 ± 0.6 cups per day to 1.6 ± 0.8 cups per day (P <.0001).

Fruit intake increased from 0.5 ± 0.5 cups per day to 0.7 ± 0.7 cups per day, but was not statistically significant. Milk group food consumption increased from 1.0 ± 0.8 cups per day to 1.6 ± 1.5 cups per day, which is also a positive trend but not statistically significant.

Data also indicates improvements in Recommended Daily Allowance (RDA) intakes (Table 3).

Table 3

Clarke-Gwinnett and GAEFNEPHispanic Participants Meeting RDA for Calcium, Vitamin A, Vitamin C, Sodium, Fiber and Fat at Pre-Intervention and Post-Intervention

<i>Nutrient</i>	Clarke-Gwinnett		GAEFNEPHispanic	
	<i>Pre-test</i> n=26	<i>Post-test</i> n=26	<i>Pre-test</i> n=429	<i>Post-test</i> n=429
Calcium	%	%	%	%
<69% RDA	76.9	50.0	63.4	39.4
70-99% RDA	11.5	30.8*	20.5	25.6
>99% RDA	11.5	19.2	16.1	35.0
Vitamin A	%	%	%	%
<69% RDA	80.8	65.4	72.3	45.2
70-99% RDA	19.2	15.4	15.4	22.6
>99% RDA	0.0	19.2*	12.4	32.2
Vitamin C	%	%	%	%
<69% RDA	76.9	42.3	57.1	32.7
70-99% RDA	11.5	15.4	9.6	10.3
>99% RDA	11.5	42.3*	33.3	57.1
Sodium (mg)	%	%	%	%
1500-2400	19.2	50.0*	26.1	31.9
2401-3300	34.6	30.8	22.1	23.5
>3300	19.2	3.8	23.3	29.4
Fiber (g)	%	%	%	%
5-15	73.1	57.7*	48.0	29.8
16-24	3.8	30.8*	20.3	29.8
>24	3.8	7.7	14.7	35.7
Fat (percent of calories from fat)	%	%	%	%
<29%	38.5	61.6	34.7	43.8
30-34%	11.5	23.1	25.4	25.9
35-39%	23.1	7.7*	16.1	15.4
>39%	26.9	7.7*	23.8	14.9

GAEFNEPHispanic participants' average intake for vitamin A was 61.4% of the RDA at the beginning of the intervention and 100% of the RDA for vitamin A post-intervention. Vitamin C also increased; participants' average intake was 87.5% of the RDA at baseline and 155%

of the RDA after the intervention. Clarke-Gwinnett participants' average intake for vitamin A was 45% of the RDA at baseline. Following the intervention, this percentage increased to 69.5% of the RDA for vitamin A (P =.019). The Clarke-Gwinnett participants' average intake for

vitamin C was 57.6% of the RDA at the beginning of the intervention; post- intervention, this number increased to 104.2% of the RDA for vitamin C ($P = .034$).

Sodium reduction was an important aspect of the curriculum and was emphasized heavily throughout the sessions since the curriculum was developed primarily for African Americans and 40.0% of African-American women are currently diagnosed with hypertension (CDC, 2019). The percentage of participants who consumed the recommended intake of sodium per day (no more than 2,400 mg) increased from 19.2% ($n=5$) to 50% ($n=13$) in the Clarke-Gwinnett group ($P=.0004$) and the mean reduction of sodium intake was 177 mg per day ($2376 \pm 904\text{mg}$ to $2199 \pm 631\text{mg}$). GAEFNPHispanic showed less improvement in sodium intake. Participants who did not exceed the recommended 2,400mg of sodium per day increased from 26.1% ($n=111$) at baseline to 31.9% ($n=137$) post-intervention, and there was a mean increase in 285 mg of sodium per day (2469 ± 1460 mg to 2754 ± 1397 mg) (Table 3).

Following the intervention, 7.7% ($n=2$) of Clarke-Gwinnett participants consumed more than 39% of their calories from fat compared to 26.9% ($n=7$) at baseline ($P=.022$) (Table 3). Fat grams decreased from 44.8 ± 21.1 grams per day to 32.8 ± 13.6 grams per day ($P=.033$) (Table 3). The GAEFNPHispanic group also decreased their percent of calories from fat; 23.9% of participants consumed over 39% of their calories from fat at baseline versus 14.9% after the intervention (Table 3). However, their mean fat intake increased from 52.6 ± 33.6 to 59.8 grams ± 32.1 grams per day (Table 2). Calorie intake in the Clarke-Gwinnett group decreased an average of 85 calories per day (1175 ± 394 to 1090 ± 349) and GAEFNPHispanic participants consumed an average of 302 (1384 ± 698 to 1686 ± 684) more calories a day (Table 2).

The Healthy Eating Index (HEI) component was analyzed, and outcomes can be found in Table 2. HEI for fruits, vegetables, fat, sodium, and overall HEI were analyzed. Results show congruency with the increase of fruit and vegetable intake. Clarke-Gwinnett HEI for vegetables increased from 3.1 ± 2.3 to 6.2 ± 2.4 ($P<.0001$) and GAEFNPHispanic HEI for vegetables increased from 4.0 ± 3.3 to 6.1 ± 3.2 at the post-test ($P<.0001$). HEI for fruits was 2.7 ± 3.0 at the pre-test and 3.6 ± 3.4 at the post-test for Clarke-Gwinnett, yet it was not statistically significant. GAEFNPHispanic showed a HEI for fruit to be 3.6 ± 3.5 at baseline and 6.8 ± 3.8 post- intervention ($P<.0001$). HEI for total fat also improved in both groups showing an increase of 6.1 ± 3.6 to 8.7 ± 2.4 for Clarke- Gwinnett ($P<.0001$) and 6.5 ± 3.7 to 7.4 ± 3.3 for GAEFNPHispanic ($P<.0001$). HEI for sodium increased the least out of all HEI scores for Clarke-Gwinnett (8.4 ± 2.3 to 9.5 ± 1.1) and decreased for GAEFNPHispanic (7.7 ± 3.4 to 7.4 ± 3.4), which correlates with the increase in total sodium post-intervention. Overall HEI for Clarke-Gwinnett increased from 55.8 ± 14.2 to 68.4 ± 13.3 ($P<.0001$) and

57.0 ± 13.6 to 69.8 ± 13.4 for GAEFNPHispanic ($P<.0001$). Both GAEFNPHispanic and Clarke-Gwinnett showed a positive change in all of the food groups following the intervention (98.8% and 100% respectively).

Food Behavior Checklist Results

GAEFNPHispanic and Clarke-Gwinnett groups both demonstrated improvement in nutrition-related behaviors (Table 4).

The Food Behavior checklist provided questions relating to nutrition practices. When asked, "How often do you plan meals ahead of time?", Clarke-Gwinnett results indicated that about 19% of participants stated in the pre-test that they never planned meals ahead of time, and 19% said they planned meals ahead of time most of the time. In the post-test, 50% of participants stated they planned meals ahead of time or most of the time ($P <.0001$). GAEFNPHispanic did not show such a vast increase with 28% of participants never planning meals ahead of time in the pre-intervention to 39% almost always planning meals ahead of time post-intervention ($P <.0001$). When asked, "When deciding to feed your family, how often do you think of healthy food choices?", Clarke-Gwinnett results showed that 8% of the participants almost always thought about healthy food choices in the pre-test compared to 42% in the post-test ($P <.0001$). GAEFNPHispanic showed similar results with 18% almost always thinking about healthy food choices at baseline compared to 47% in the post-test ($P <.0001$). When asked, "How often do you use the 'Nutrition Facts' on the food label to make choices?", GAEFNPHispanic and Clarke-Gwinnett groups both showed a large improvement. Clarke-Gwinnett increased from 4% of the participants almost always reading nutrition labels to 42% reading labels most of the time and 42% reading labels almost always ($P <.0001$). At baseline, 10% of GAEFNPHispanic participants read labels most of the time and 8% read labels almost always. Post-intervention, 32% read labels most of the time and 42% read labels almost always ($P <.0001$).

DISCUSSION

Research on how to deliver nutrition education interventions to low-income, minority populations who have a higher incidence of nutrition-related diseases is limited (Eakin et al., 2007; Venditti, 2017). The percentage of Hispanics in Georgia who do not consume the adequate five fruit servings per day (81.9%) is lower when compared to Caucasians (89.2%) and African Americans (87.5%) (Lee-Kwan et al., 2015). Conversely, fewer Hispanic and African American Georgia residents meet the federal vegetable intake recommendations compared to Caucasian Georgia residents (5.4%, 7.1%, and 10.1%, respectively). Most research on nutrition interventions in minority populations is focused on culturally appropriate programs, and further research is needed to find out if methods used in

Table 4

Clarke-Gwinnett and GAEFNEPHispanic Food Behavior Checklist Results at the Pre-Intervention and Post-Intervention

<i>Question Description</i>	Clarke-Gwinnett			GAEFNEPHispanic		
	<i>Pre-test n=26</i>	<i>Post-test n=26</i>	<i>P value</i>	<i>Pre-test n=429</i>	<i>Post-test n=429</i>	<i>P value</i>
How often do you plan meals ahead of time?	n (%)	n (%)	<0.001*	n (%)	n (%)	<0.001*
No response	1 (4)	0 (0)		11 (13)	3 (1)	
Do not do	5 (19)	0 (0)		118 (28)	4 (1)	
Seldom	3 (12)	2 (8)		59 (14)	19 (4)	
Sometimes	9 (35)	7 (27)		118 (28)	68 (16)	
Most of the time	5 (19)	13 (50)		64 (15)	169 (39)	
Almost always	3 (12)	4 (15)		59 (14)	166 (39)	
When deciding to feed your family, how often do you think of healthy food choices?	n (%)	n (%)	<0.001*	n (%)	n (%)	<0.001*
No response	0 (0)	0 (0)		11 (13)	8 (2)	
Do not do	2 (8)	0 (0)		45 (10)	6 (1)	
Seldom	5 (19)	0 (0)		33 (8)	6 (1)	
Sometimes	11 (42)	1 (4)		125 (29)	30 (7)	
Most of the time	6 (23)	14 (54)		136 (32)	179 (42)	
Almost always	2 (8)	11 (42)		79 (18)	200 (47)	
How often do you prepare foods without adding salt?	n (%)	n (%)	<0.001*	n (%)	n (%)	<0.001*
No response	4 (15)	0 (0)		22 (5)	7 (2)	
Do not do	9 (35)	3 (12)		223 (52)	43 (10)	
Seldom	9 (35)	5 (19)		101 (24)	79 (18)	
Sometimes	3 (12)	9 (35)		52 (12)	165 (38)	
Most of the time	0 (0)	6 (23)		17 (4)	82 (19)	
Almost always	1 (4)	3 (12)		14 (3)	53 (12)	
How often do you use the "Nutrition Facts" on the food label to make choices?	n (%)	n (%)	<0.001*	n (%)	n (%)	<0.001*
No response	1 (4)	0 (0)		12 (3)	8 (2)	
Do not do	8 (31)	0 (0)		180 (42)	14 (3)	
Seldom	5 (19)	0 (0)		63 (15)	18 (4)	
Sometimes	6 (23)	4 (15)		95 (22)	71 (17)	
Most of the time	5 (19)	11 (42)		44 (10)	136 (32)	
Almost always	4 (42)	11 (42)		35 (8)	182 (42)	
How often do your children eat something in the morning within 2 hours of waking up?	n (%)	n (%)	<0.001*	n (%)	n (%)	<0.001*
No response	3 (12)	0 (0)		24 (6)	15 (3)	
Do not do	1 (4)	1 (4)		59 (14)	17 (4)	
Seldom	6 (23)	2 (8)		33 (8)	14 (13)	
Sometimes	4 (15)	3 (12)		79 (18)	31 (7)	
Most of the time	7 (27)	10 (38)		129 (30)	87 (20)	
Almost always	5 (19)	10 (38)		105 (24)	265 (62)	

one group will work in another (Cui et al., 2015). This intervention is of great value for both the well-being of the Hispanic population of Georgia and for the state in its quest to provide nutrition education to this population. Furthermore, it addresses low-income and Spanish-speaking participants' dietary improvements due to an intervention that was culturally modified but not developed for that precise population.

Data from this study support the hypothesis that an evidence based nutrition curriculum for limited resources EFNEP participants in the State of Georgia will also benefit Hispanic participants. The major outcomes were: 1) A decrease in perceived barriers to eating healthfully, 2) an increase in vegetable, fruit and milk group foods cups per day, 3) increase in RDA for vitamins A and C and a decrease in the percentage of calories from fat and grams of fat, and 4) overall positive changes in behavioral factors relating to nutrition. The underlying messages for the EFNEP nutrition education sessions emphasized increasing fruit, vegetable, and low-fat dairy consumption and decreasing sodium intake. The main difference seen between the two groups was fruit intake. Factors that could contribute to the discrepancy between the fruit intake of GAEFNEPHispanic versus Clarke-Gwinnett is that the curriculum was taught at different times of the year and where the availability and cost of fresh produce may have differed. Fresh fruit availability is very seasonal, whereas most vegetables are available throughout the year.

One of the major goals of the curriculum was to improve food behaviors, which were measured by the food behavior checklist. Both GAEFNEPHispanic and Clarke-Gwinnett had statistically significant increases ($p < .0001$) for all the behavior checklist questions. The majority of the participants stated that after the intervention, they planned meals ahead of time, made healthy food choices, prepared foods without adding salt, read nutrition labels more, and more often prepared breakfast for their children than before the intervention. The fact that every question yielded a significant increase in both groups supports the effectiveness of this curriculum in improving food related behaviors of Hispanic participants.

Other interventions have shown dietary improvements in the Hispanic population with an intervention that was not developed for that precise population and was implemented in different populations (O'Mara et al., 2015). Buller et al. (1999) conducted a randomized peer education trial to increase fruit and vegetable consumption among Caucasians, Hispanics, Native Americans, and African Americans using the Five a Day Education Program. Results showed an increase in both fruit and vegetable consumption. Spanish-speaking peer educators led the educational sessions for the Hispanic participants and used the same Five a Day Guidebook as the other groups. Peer educators had similar characteristics to their audience, such as age,

education level, and background, as peer educators are effective in providing nutrition information to the community because they modify the environment to an informal setting and demonstrate a commitment to the group since the educators and individuals have an understanding of one another (Ball et al., 2017). Researchers concluded that participants could reciprocate peer educators' support by adopting their recommendations and healthy behaviors. Food Talk was developed for low-income adults who may also have low literacy (Hanula, 2009). The intervention was delivered in Spanish with the help of a translator when Food Talk was conducted with Hispanic individuals and groups that were predominantly Hispanic. It is critical that the nutrition educator who works with Spanish-speaking clients is prepared to provide culturally and linguistically appropriate information to this growing segment of the population, since language has been recognized as one of the most influential factors in quality of care (Adkins, 2017). This point is so important that work from this nutrition intervention has resulted in the translation of UGA's EFNEP Food Talk into the current Hablemos de Comida Curriculum. Modifications similar to what is described in this study have been made to engage and provide culturally appropriate nutrition education to the Hispanic EFNEP population here in Georgia. Currently, bi-lingual Spanish speaking EFNEP peer nutrition educators who are part of the Hispanic communities in which they teach, deliver Hablemos de Comida in about 10 counties throughout Georgia. This is an expansion of this original study population and the ongoing efforts of EFNEP in the state of Georgia and UGA Family and Consumer Sciences Cooperative Extension. The implications of this research are that providing a culturally appropriate nutrition education program for limited resources Hispanic EFNEP participants and in the native language could result in improved nutrition behaviors and ultimately better outcomes in chronic disease prevention (obesity, hypertension, diabetes) in this at-risk and underserved population. This current research sets the stage for future research in the growing Hispanic population in Georgia.

Limitations of this study include the low dose, the use of a 24-hour diet recall, and participation numbers. The intervention was relatively low dose, which could explain the small magnitude in changes in some foods and nutrients. Although the 24-hour diet recall is the EFNEP nationally mandated evaluation measure, it may not be the best indicator of a person's dietary habits since the day the information was collected may have been a day when the participant did not follow a normal dietary pattern. Because the 24-hour diet recalls were derived from measures of a single day, the group means were inflated because it estimated the prevalence of inadequate or excessive intake (Tooze et al., 2017). The greatest difficulty in estimating portion sizes could be associated with items that could not be visualized separately (Kirkpatrick et al., 2018). With respect to data analysis and record keeping, staff needs to be

comprehensively trained regarding the entry of data from 24-hour diet recall to NEERS5 to ensure accuracy. Due to the fact that there are 7,215 items representing 60,000 nutrient values, confusion can often occur when entering the food items. A limitation of the Clarke-Gwinnett portion of the study was the low number of participants. Because the authors of this paper did not teach the curriculum to GAEFNEPHispanic, they are not aware of how accurately it was taught, if the 24-hour diet recall kit was appropriately used to educate the participants on proper documentation of food intake, if any additional information was provided to the participants, or if any program information was omitted. All these factors could have contributed to an increase or a decrease in the effectiveness of the evaluation.

Effective nutrition education programs for Hispanics that target healthy eating behaviors and barriers to the consumption of fruits and vegetables are needed to increase the percentage of Hispanics in the U.S. who consume five fruits and vegetables a day. This intervention was successful in achieving these goals and supports the use of the Food Talk curriculum with the Hispanic population in Georgia, thus meeting an important social need.

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