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Structural racism has contributed to increased poverty, food insecurity, and obesity rates among African Americans relative to Whites. Nutrition education programs should therefore consider how well they serve this population. The objective of this investigation was to assess whether African American and White Supplemental Nutrition Assistance Program Education (SNAP-Ed) participants in Louisiana had comparable dietary behavior outcomes by conducting secondary data analysis of previous program evaluations from 2017-2018 and 2018-2019 among African American and White SNAP-Ed participants (n = 434). Variables measured included pre- to post-intervention changes in dietary behaviors (e.g., self-reported consumption frequency of fruit, vegetables, whole grains, low-fat dairy, sugar-sweetened beverages, and juice). Statistical analyses included t-tests stratified by race and Pearson's chi-square test for categories of change in dietary behaviors. In categorical analyses, Whites had increased consumption, and African Americans had decreased consumption of whole grain pasta following SNAP-Ed participation. Among those who did not change consumption patterns following SNAP-Ed participation, African Americans were more likely to consume fruit juice and juice-flavored sugary drinks at a rate above median consumption compared to White participants. Future research should identify how program participation is followed by different dietary behavior outcomes in different races and explore how SNAP-Ed could specifically address barriers to equity.

Keywords: Supplemental Nutrition Assistance Program, health equity, nutrition education, SNAP-Ed

Introduction

African Americans have higher rates of obesity, food insecurity, and poverty than White residents in the United States (Coleman-Jensen et al., 2018; Hales et al., 2017; Semega et al., 2019). Structural racism is a major contributing factor to these inequalities, defined as "the

totality of ways in which societies foster racial discrimination through mutually reinforcing systems of housing, education, employment, earnings, benefits, credit, media, health care, and criminal justice" (Bailey et al., 2017). Structural racism has impacted African Americans' access to healthcare, education, and economic stability and constrained African Americans' health behaviors through residential segregation and socioeconomic disadvantage ("Racial and Ethnic Health Disparities and Chronic Disease Issue Brief," 2021; Williams et al., 2019).

Federally funded nutrition education programs such as the Supplemental Nutrition Assistance Program Education (SNAP-Ed) and the Expanded Food and Nutrition Education Program (EFNEP) are intended to address obesity and food insecurity by providing education to help participants make healthier food choices within limited budgets (United States Department of Agriculture Food & Nutrition Service, 2021; United States Department of Agriculture National Institute of Food and Agriculture, n.d.). If these programs seek to improve the nutritional status of all participants, they must take into consideration the disparity in health and nutritional status of African Americans compared to White Americans and consider the role that all factors, including structural racism, have played in shaping African Americans' experiences and food environments. A recent editorial in the *Journal of Nutrition Education and Behavior* stressed the need for nutrition educators to acknowledge the role that structural racism has played in limiting peoples' ability to lead hunger-free lives and make healthful food choices (Singleton et al., 2021). For example, African American neighborhoods often have a higher density of fast food restaurants (Cooksey-Stowers et al., 2017; Cooksey Stowers et al., 2020) and fewer full-service grocery stores (Walker et al., 2010). African Americans are also exposed to targeted marketing for unhealthy foods and beverages (Grier & Kumanyika, 2008; Harris, 2020).

Federally funded nutrition education programs like SNAP-Ed and EFNEP are increasingly focused on implementing policy, systems, and environmental (PSE) changes alongside educational programs to promote healthful eating. These PSE change interventions promote healthy eating and increased physical activity according to the social-ecological model of behavior change, which acknowledges influences on health behaviors beyond individual-level knowledge and motivation (Story et al., 2008). These types of changes, especially when paired with education, could play an important role in addressing barriers to healthful eating imposed on African Americans by structural racism. However, educators and administrators working for SNAP-Ed and EFNEP face barriers to adapting existing education-focused programs to implement PSE changes (Draper & Younginer, 2021; Haynes-Maslow et al., 2018), and nutrition education remains the main focus of these programs.

Because federally-funded programs like SNAP-Ed and EFNEP continue to focus on nutrition education and there are multiple overlapping barriers to achieving health equity among African Americans, it is important to assess whether nutrition education programs provide equitable service to that population. Disaggregating data by race is one suggested way to promote racial health equity (Gamblin & King, 2021; Kauh et al., 2021), including the disaggregation of

program evaluation data to assess whether outcomes are similar across racial groups. SNAP-Ed and EFNEP are core federal nutrition interventions, yet little research has examined racial equity in dietary behavior changes following participation in either program.

Structural racism and the barriers it poses to healthy eating and physical activity among African Americans are of particular concern in Louisiana, a state with the fourth highest adult obesity rate, third highest food insecurity rate, and third highest percentage of African American residents of any state (Coleman-Jensen et al., 2018; Gundersen et al., 2018; Hales et al., 2017). Prior qualitative research conducted with rural African American residents in Louisiana indicated this population experiences insufficient food access and faces multiple barriers to food acquisition (Holston et al., 2020). Evaluations of the SNAP-Ed program in this state have not previously disaggregated data for White and African American participants to assess whether both groups benefit similarly from the program. This study, therefore, examines SNAP-Ed program evaluation data in Louisiana for African American and White participants. More specifically, the objectives of this investigation are to determine whether dietary behavior change outcomes from program participation differ by race. This investigation is also intended to serve as an example that leaders and evaluators of SNAP-Ed, EFNEP, and other nutrition education programs implemented in racially diverse contexts may use to assess whether the efficacy of programs is equitable and where equity may be enhanced.

Methods

Data and Sample

This investigation includes a secondary analysis of program evaluation data collected by the Louisiana State University Agriculture Center (LSU AgCenter) SNAP-Ed Program from Federal Fiscal Years (October 1 to September 30) 2017-2018 and 2018-2019. The investigation was deemed exempt from review by the Louisiana State University Agriculture Center Institutional Review Board. The SNAP-Ed program at the LSU AgCenter implements an educational curriculum in a series of four to six lessons, each focused on different food groups and recommendations from the U.S. Department of Agriculture's Dietary Guidelines for Americans. Two separate, age-appropriate versions of the curriculum are used for adults and youth. However, they each cover the same topics in the same order in the first four lessons (fruits and vegetables; dairy; whole grains; and sugary drinks and healthier drink choices) with optional additional lessons covering protein foods, physical activity, and other topics.

Evaluations consisted of surveys administered before and after program participation in which participants rated their frequency of selected dietary behaviors within the past week on a Likert scale with responses ranging from 1 to 5 (1 = *Never*, 2 = *Some of the time*, 3 = *About half of the time*, 4 = *Most of the time*, 5 = *All of the time*). Dietary behaviors studied included the consumption of fruit, vegetables, whole grain pasta, whole grain bread, whole grain cereal, low-fat and whole milk, low-fat yogurt and cheese, sugar-sweetened beverages (SSBs), fruit juice-

flavored SSBs, and whole fruit juice. Evaluations focused on the consumption of these foods because these topics were covered in SNAP-Ed lessons for both youth and adults. The consumption of these foods was expected to change following participation in the program for both groups. A separate question about juice-flavored SSBs was included due to concerns about misconceptions of juice-flavored drinks as "healthy" alternatives to soda (Pomeranz & Harris, 2020). Identical survey questions were used for adult and youth participants. The exact wording of the question was "Please rate how often you consumed the following foods in the past week," followed by a list of the foods named above.

The surveys used were assessed for face validity by a group of Extension staff at the LSU AgCenter and piloted with both adult and youth groups of the target audience before use. Data were only collected from participants attending a complete series of four to six SNAP-Ed lessons lasting a minimum of 30 minutes. Surveys were conducted in person on iPads using Qualtrics survey software, and data were maintained in a secure online database (*Qualtrics*, 2021).

Data Analysis

Raw data from previous evaluations of the SNAP-Ed program were downloaded from a secure database and cleaned so that only complete pairs of responses from the same participants to pre- and post-test surveys remained. A total of 1,474 responses to pre- and post-test surveys were collected from FFY 2017-18 and 2770 responses from FFY 2018-19. Of those responses, 990 consisted of matched, complete responses from the same participant, leaving 495 participants with both pre and post-test responses (260 from FFY 2017-2018 and 235 from 2018-2019). Of these 495, 434 identified as White (n = 149, 34%) or African American (n = 285, 66%). The other 61 participants identified as Hispanic or "other" and were not included in this analysis given the low proportion of SNAP-Ed participants in Louisiana in these groups and because the SNAP-Ed eligible population in Louisiana is majority (93%) African American or White (U.S. Census Bureau, 2018). The sample included responses from 332 youth aged 9-18 and 102 adults over 18. Though the sample included both adults and youth, the groups were not related and were exposed to curricula that covered the same topics in the same order described above.

Outcome variables came from measures of pre and post-test consumption of fruit, vegetables, whole grain pasta, whole grain bread, whole grain cereal, low-fat and whole milk, low-fat yogurt and cheese, sugar-sweetened beverages (SSBs), fruit juice flavored SSBs, and whole fruit juice. On average, pre- and post-test dietary behaviors were measured eight weeks apart (4 weeks to 24 weeks). Predictor variables included program year in which the evaluation was conducted, race (African American, White), and age (less than 18, 18 and older). No other demographic covariates were available for analysis.

Assessment of pre-and post-test dietary behaviors proceeded in several steps. First, pre-and post-test dietary behaviors were treated as continuous, and paired t-tests were used to identify differences in the mean response to each question from pre-test to post-test. Although responses

to questions on Likert scales are categorical, they may be treated as continuous if responses are normally distributed (Sullivan & Artino, Jr., 2013). Each dietary variable studied was examined for normality and found to be normally distributed at pre-test and post-test. The Bonferroni correction accounted for the familywise error rate introduced when performing multiple *t*-tests, and significance was set *a priori* at $p < 0.005$ because 11 *t*-tests were conducted. Tests were conducted separately for White and African American participants to identify differences in dietary behavior outcomes.

Second, pre- to post-test change scores were calculated for each dietary behavior. Participants were categorized according to whether they reported an increase in the selected behavior, a decrease, or did not change their behavior with exposure to SNAP-Ed. Pearson's chi-square tests were conducted to identify racial differences by behavior change category. Finally, participants who did not change from pre- to post-test for a given dietary behavior were then categorized according to whether their reported frequency of engaging in the behavior was below median consumption or at or above median consumption throughout the study period. Pearson's chi-square tests were conducted to identify racial differences across these consumption categories in those participants unchanged by SNAP-Ed participation. Data were analyzed using Stata version 16.1 (StataCorp, 2019).

Results

Table 1 presents disaggregated results of paired *t*-tests for mean scores of dietary behaviors from pre-test to post-test. For the majority of dietary behaviors studied, racial differences in outcomes from participation in the LSU AgCenter SNAP-Ed program were not statistically significant. Those behaviors for which SNAP-Ed participation resulted in dietary behavior change outcomes with different statistical significance for African American and White participants based on disaggregated results of *t*-tests included the consumption of whole grain pasta, low-fat milk, and whole fruit juice. A significant increase in whole grain pasta consumption ($p = 0.001$) and a marginally significant increase in low-fat milk consumption ($p = 0.053$) were both observed only in White participants. African American participants reported increased consumption of 100% fruit juice with marginal significance ($p = 0.005$), while White participants did not report a statistically significant increase in the behavior.

Table 1. Difference in Mean Reported Frequency of Dietary Behaviors from Pre-test to Post-test, Disaggregated by Race

Variable of Interest	White Participants ($n = 149$)	African American Participants ($n = 285$)
Reported frequency of fruit consumption[1]		
Pre-test[2]	2.88 [2.67, 3.08]	3.05 [2.89, 3.21]
Post-test[2]	3.13 [2.92, 3.33]	3.26 [3.10, 3.42]
p-value[3]	0.021	0.014

Variable of Interest	White Participants (n = 149)	African American Participants (n = 285)
Reported frequency of vegetable consumption		
Pre-test	2.41 [2.20, 2.62]	2.41 [2.26, 2.57]
Post-test	2.57 [2.36, 2.78]	2.53 [2.36, 2.69]
p-value	0.129	0.136
Reported frequency of whole grain pasta consumption		
Pre-test	1.83 [1.64, 2.02]	2.11 [1.94, 2.27]
Post-test	2.16 [1.96, 2.37]	2.27 [2.10, 2.43]
p-value	0.001	0.107
Reported frequency of whole grain bread consumption		
Pre-test	2.81 [2.56, 3.06]	2.72 [2.53, 2.91]
Post-test	2.69 [2.46, 2.91]	2.71 [2.53, 2.90]
p-value	0.271	0.934
Reported frequency of whole grain cereal consumption		
Pre-test	2.58 [2.33, 2.82]	2.8 [2.61, 2.99]
Post-test	2.77 [2.53, 3.02]	2.96 [2.77, 3.15]
p-value	0.105	0.102
Reported frequency of low-fat milk consumption		
Pre-test	1.80 [1.58, 2.02]	1.81 [1.67, 1.97]
Post-test	2.04 [1.81, 2.27]	1.92 [1.76, 2.08]
p-value	0.053	0.247
Reported frequency of whole milk consumption		
Pre-test	3.30 [3.04, 3.56]	2.87 [2.69, 3.06]
Post-test	3.19 [2.94, 3.45]	3.02 [2.83, 3.21]
p-value	0.427	0.180
Reported frequency of low-fat yogurt or cheese consumption		
Pre-test	2.63 [2.37, 2.89]	2.39 [2.22, 2.55]
Post-test	2.62 [2.38, 2.87]	2.51 [2.33, 2.68]
p-value	0.955	0.251
Reported frequency of limiting sugar-sweetened beverages		
Pre-test	2.68 [2.45, 2.92]	2.64 [2.47, 2.81]
Post-test	2.86 [2.61, 3.10]	2.58 [2.41, 2.75]
p-value	0.191	0.528
Reported frequency of whole fruit juice consumption		
Pre-test	2.97 [2.74, 3.22]	3.45 [3.28, 3.61]
Post-test	3.09 [2.84, 3.45]	3.72 [3.55, 3.89]
p-value	0.342	0.005
Reported frequency of juice-flavored sugary drink consumption		
Pre-test	3.01 [2.77, 3.24]	3.64 [3.48, 3.80]
Post-test	2.90 [2.67, 3.12]	3.66 [3.49, 3.83]
p-value	0.301	0.831

1. Reported as mean response on a 5-point Likert scale (1 = *Never*, 2 = *Some of the time*, 3 = *About half of the time*, 4 = *Most of the time*, 5 = *All of the time*)
2. Pre- and Post-test values reported as mean and 95% confidence interval
3. Significance set at $p < 0.005$ according to Bonferroni correction for the familywise error rate

Table 2 displays categories of change from pre-test to post-test by race. Only one dietary variable differed significantly for African American and White participants. Compared to White participants, a significantly higher proportion of African American participants decreased whole grain pasta consumption following SNAP-Ed participation ($p = 0.017$). A sensitivity analysis was performed using multinomial logistic regression (not shown) with no change in whole grain pasta consumption from pre-test to post-test contrasted with increased and decreased consumption. Age category and survey year were controlled. Results showed that the racial difference in whole grain pasta consumption remained statistically significant.

Table 2. Categories of Change in Dietary Behaviors from Pre- to Post-intervention by Race

Dietary Variable of Interest	White ($n = 149$)	African American ($n = 285$)	Total ($n = 434$)	p value[1]
Fruit				
Decrease	34 (24.4)[2]	56 (21.2)	90 (22.3)	0.674
No change	55 (39.6)	115 (43.6)	170 (42.2)	
Increase	50 (36.0)	93 (35.2)	143 (35.5)	
Vegetable				
Decrease	32 (23.4)	57 (23.0)	89 (23.1)	0.239
No change	61 (44.5)	115 (46.4)	176 (45.7)	
Increase	44 (32.1)	76 (30.7)	120 (31.2)	
Whole grain pasta				
Decrease	20 (14.3)	68 (26.4)	88 (22.1)	0.017*
No change	76 (54.3)	113 (43.8)	189 (47.5)	
Increase	44 (31.4)	77 (29.8)	121 (30.4)	
Whole grain bread				
Decrease	43 (30.5)	68 (26.8)	111(28.1)	0.661
No change	60 (42.5)	119 (26.8)	179 (45.3)	
Increase	38 (27.0)	67 (26.4)	105 (26.6)	
Whole grain cereal				
Decrease	33 (23.2)	72 (28.2)	105 (26.4)	0.553
No change	57 (40.1)	97 (38.0)	154 (38.8)	
Increase	52 (36.6)	86 (33.7)	138 (37.8)	
Low-fat milk				
Decrease	10 (8.0)	19 (8.6)	29 (8.3)	0.903
No change	76 (60.8)	138 (62.4)	214 (61.8)	
Increase	39 (31.2)	64 (29.0)	103 (29.8)	
Whole milk				
Decrease	44 (31.4)	73 (28.5)	117 (29.5)	0.269
No change	62 (44.3)	101 (39.4)	163 (41.2)	
Increase	34 (24.3)	82 (32.0)	116 (29.3)	
Low-fat yogurt or cheese				
Decrease	36 (26.1)	73 (28.4)	109 (27.6)	0.602
No change	62 (44.9)	102 (39.7)	164 (41.5)	
Increase	40 (29.0)	82 (31.9)	122 (30.9)	

Dietary Variable of Interest	White (*n* = 149)	African American (*n* = 285)	Total (*n* = 434)	*p* value[1]
Sugar-sweetened beverages[3]				
Decrease	44 (31.6)	69 (31.1)	123 (31.3)	0.127
No change	42 (30.2)	100 (39.4)	142 (36.1)	
Increase	53 (38.1)	75 (29.5)	128(32.6)	
Fruit juice-flavored sugary drinks				
Decrease	41 (30.1)	70 (27.8)	111 (28.6)	0.198
No change	64 (47.1)	103 (40.9)	167 (43.0)	
Increase	31 (22.8)	79 (31.3)	110 (28.4)	
100% fruit juice				
Decrease	35 (25.2)	59 (23.3)	94 (24.0)	0.282
No change	68 (48.9)	109 (43.1)	177 (45.1)	
Increase	36 (25.9)	85 (33.6)	121 (30.9)	

1. Result of Pearson's chi-square test
2. Presented as *n* (%)
3. Reverse coded

When those who did not change from pre-test to post-test were examined more closely (Table 3), a significantly higher proportion of African Americans in that category reported consumption of juice-flavored drinks and 100% fruit juice at or above the median ($p = 0.009$ and 0.000, respectively).

Additional analyses were also performed on variables created by combining dietary behaviors that could be reasonably assumed to change in tandem (fruit and vegetable consumption, consumption of all dairy products, and consumption of all whole grain products). No significant differences by race were identified for these combined variables for any previously described analyses.

Table 3. Dietary Behaviors of Participants Unchanged by Intervention by Race

Dietary Variable of Interest	White (*n* = 149)	African American (*n* = 285)	Total (*n* = 434)	*p* value[1]
Fruit (*n* = 170)				
Below median consumption	31 (56.4)[2]	53 (46.1)	84 (49.4)	0.210
At or above median consumption	24 (43.6)	62 (53.9)	86 (50.6)	
Vegetable (*n* = 176)				
Below median consumption	16 (26.2)	36 (31.3)	52 (29.6)	0.483
At or above median consumption	45 (73.8)	79 (68.7)	124 (70.5)	
Whole grain pasta (*n* = 189)				
Below median consumption	42 (55.3)	60 (53.1)	102 (54.0)	0.770
At or above median consumption	34 (44.7)	53 (46.9)	87 (46.0)	
Whole grain cereal (*n* = 154)				
Below median consumption	40 (70.2)	53 (54.6)	93 (60.4)	0.057
At or above median consumption	17 (29.8)	44 (45.4)	61 (39.6)	
Whole grain bread (*n* = 179)				
Below median consumption	16 (26.7)	40 (33.6)	56 (31.3)	0.344
At or above median consumption	44 (73.3)	79 (66.4)	123 (68.7)	

Dietary Variable of Interest	White (n = 149)	African American (n = 285)	Total (n = 434)	p value[1]
Low-fat milk (n = 214)				
Below median consumption	0 (0)	0 (0)	0 (0)	
At or above median consumption	76 (100)	138 (100)	214 (0)	
Whole milk (n = 163)				
Below median consumption	28 (45.2)	59 (58.4)	87 (53.4)	0.100
At or above median consumption	34 (54.8)	42 (41.6)	76 (46.6)	
Low-fat yogurt or cheese (n = 164)				
Below median consumption	24 (38.7)	35 (35.3)	60 (36.6)	0.660
At or above median consumption	38 (61.3)	66 (64.7)	104 (63.4)	
Sugar-sweetened beverages (n = 142)[3]				
Below median	11 (26.2)	28 (28.0)	39 (27.5)	0.825
At or above median	31 (73.8)	72 (72.0)	103 (72.5)	
100% fruit juice (n = 177)				
Below median consumption	38 (55.9)	39 (35.8)	77 (43.5)	0.009*
At or above median consumption	30 (44.1)	70 (64.2)	100 (56.5)	
Fruit-flavored sugary drinks (n = 167)				
Below median consumption	44 (68.7)	31 (30.1)	75 (44.9)	0.000*
At or above median consumption	20 (31.3)	72 (69.9)	92 (55.1)	

1. Result of Pearson's chi-square test
2. Presented as n (%)
3. Reverse coded

Discussion

African Americans are more likely than White Americans to experience obesity, food insecurity, and poverty (Coleman-Jensen et al., 2018; Hales et al., 2017; Semega et al., 2019). On average, African Americans face a remarkably different food environment than White Americans because of barriers imposed by structural racism (Bailey et al., 2017; New York Law School Racial Justice Project, 2012). Nutrition educators need to consider these unique obstacles to healthy eating behaviors in this population (Singleton et al., 2021). PSE changes will play a role in addressing these barriers. Still, program evaluators should also disaggregate their data from the evaluation of educational programs to determine whether behavior change outcomes are similar for marginalized populations compared to other participants. Data disaggregation is an especially important consideration for the SNAP-Ed program in Louisiana due to the large proportion of African American residents (U.S. Census Bureau, 2018).

This investigation demonstrated that dietary behavior outcomes for African American and White participants in the LSU AgCenter SNAP-Ed program were similar for the food behaviors studied. However, this analysis identified several differences in dietary components in categorical analyses, which may indicate the need to culturally tailor the delivery or content of SNAP-Ed in Louisiana relative to the consumption of these foods.

Results from disaggregated *t*-tests showed that fruit juice consumption at baseline was significantly higher in African American participants, and the increase in those participants at post-test was marginally significant, but not in White participants. Significant differences were observed among participants who did not change their consumption of fruit juice and juice-flavored SSBs after SNAP-Ed participation. A higher proportion of African Americans who did not change their behavior after SNAP-Ed participation consumed fruit juice at rates at or above the median. Prior research has found racial disparities in consumption of juice and sugar-sweetened beverages, with African American youth's consumption of 100% juice increasing in recent years (Beck et al., 2013; Cullen et al., 2002). Consumption of sugar-sweetened beverages has been shown to negatively impact children's health (Bleich & Vercammen, 2018) and contribute to an increased risk of developing obesity among African American preschoolers (Lim et al., 2009). Prior work has also established that African Americans are exposed to targeted advertising for high-calorie foods and beverages, a structural influence that may contribute to the increased consumption of juice and juice-flavored SSBs in this population (Grier & Kumanyika, 2008). Concerns about water quality among African Americans may also contribute to increased consumption of juice and SSBs in this population (Onufrak et al., 2014). Qualitative research with rural African American residents of Louisiana also revealed that concerns about water quality impacted beverage choices and grocery budgets (Holston et al., 2020). Given the negative effects of SSB and fruit juice consumption on health, structural influences on African Americans' consumption of these beverages, and the difference observed among those SNAP-Ed participants who did not change their behavior with exposure to SNAP-Ed, the LSU AgCenter SNAP-Ed program should attempt to better address juice and juice-flavored SSB consumption in African Americans.

Disaggregated *t*-tests also found that SNAP-Ed resulted in increased consumption of whole grain pasta and low-fat milk that were significant or marginally significant only in White participants. Categorical analyses revealed that a significantly higher proportion of African American participants decreased their consumption of whole grain pasta in response to SNAP-Ed compared to White participants. This effect remained significant in a sensitivity analysis, including all covariates. Future work should identify the mechanism by which the LSU AgCenter SNAP-Ed program resulted in different effects on participants of different races. Prior research has indicated the need for nutrition education and nutrition-focused community development projects tailored to African Americans' needs and cultural practices (Kannan et al., 2010; Kumanyika, 2019). A one-size-fits-all approach that does not consider barriers to African Americans' health behaviors, including barriers stemming from structural racism, may not fit the needs of African Americans.

Because participation in SNAP-Ed is restricted to those earning at or below 185% of the federal poverty level, racial differences in educational outcomes may also be interpreted as being due to effects of structural racism beyond those related to the socioeconomic status of African Americans. For example, multiple studies of "food deserts," or areas without access to full

supermarkets (Larson et al., 2009; Walker et al., 2010) have found that these areas are significantly more likely to occur in majority African American neighborhoods than in White neighborhoods (Walker et al., 2010). A report by the ACLU states that this phenomenon is not merely "a demographic accident or a consequence of 'natural' settlement patterns. Rather, government policies and their resulting incentives have played a significant role" (New York Law School Racial Justice Project, 2012). A density study of fast food restaurants in New Orleans found significantly higher concentrations of fast food restaurants in majority Black neighborhoods (Block et al., 2004). Living in areas with a high density of fast food restaurants, termed "food swamps," is even more strongly associated with obesity than living in a neighborhood with an absence of grocery stores (Cooksey-Stowers et al., 2017). These phenomena are rooted in U.S. government policies like redlining, encouraging residential segregation and commercial flight from urban communities (New York Law School Racial Justice Project, 2012). Structural racism present in the food system has profoundly impacted African Americans' food environment. SNAP-Ed will need to consider these effects of structural racism on African Americans' food choices that go beyond the influence of individuals' socioeconomic status and impact whether participants can initiate dietary behavior changes after intervention exposure.

Given these barriers to healthy eating faced by African Americans, direct education alone will not be enough to promote healthy eating behaviors and address health equity in this population. PSE changes will play an important role in future efforts to reduce diet-related racial health disparities by changing the environment around people to reduce barriers to healthful eating. However, federally-funded nutrition education programs like SNAP-ED and EFNEP continue to emphasize nutrition education and promote PSE changes alongside, not in place of, nutrition education. Numerous challenges accompany the transition from implementing direct education to implementing PSE changes, which may slow the implementation of PSE changes (Draper & Younginer, 2021; Franck, 2016; Haynes-Maslow et al., 2018). While programs like SNAP-Ed and EFNEP continue to provide nutrition education alongside PSE change efforts, it will be important to assess racial equity in behavior change outcomes that result from educational programs. This can be accomplished by disaggregating data and closely examining outcomes experienced by program participants from historically marginalized groups, such as African Americans (Gamblin & King, 2021; Kauh et al., 2021). Future work should apply similar inquiry to PSE change efforts implemented by SNAP-Ed and EFNEP to determine whether they serve African Americans equitably.

Qualitative research should also be conducted with African American participants in the LSU AgCenter SNAP-Ed program to gain an in-depth understanding of their experiences with the program and how it meets their needs and is appropriate for their circumstances. Little research has used qualitative methods to investigate perceptions among African Americans of the SNAP-Ed program, though some studies have addressed African Americans' perceptions of WIC

(Special Supplemental Nutrition Program for Women, Infants, and Children) and other nutrition education programs (Kolavalli, 2019; Nestor et al., 2001).

Limitations

The results of this analysis should be interpreted in light of study limitations. Self-reported dietary behaviors may be subject to social desirability bias. Combining youth and adult evaluation data for this investigation was necessary given the small sample size but may have affected results, because youth dietary habits are heavily influenced by their parents' choices and the home nutrition environment (Roos et al., 2012; Russell et al., 2015). Additionally, this study's results are not generalizable to settings outside Louisiana or to other SNAP-Ed programs. A representative sample of all Louisiana's SNAP-Ed eligible residents was also not used. Study data were limited to participants completing at least four sessions in the LSU AgCenter SNAP-Ed program and who completed pre- and post-test responses. A substantial number of participants did not complete both pre-and post-tests. The final sample for this analysis was also skewed towards African American participants, representing 65% of the sample. It is, therefore, impossible to generalize the current analysis's results to all LSU AgCenter SNAP-Ed program participants in Louisiana. Despite these limitations, this investigation serves as a potential template for other agencies implementing the SNAP-Ed program or other nutrition education programs. One important potential racial difference is initial SNAP-Ed participation. Future research could compare local levels of program participation, community development project locations, and the demographic composition of the locales served, including disaggregation of evaluations and program outcomes by race and ethnicity.

Conclusion

The current study suggests that the LSU AgCenter SNAP-Ed program resulted in similar dietary behavior change outcomes for African American and White participants overall, with few differences in dietary behaviors studied. Among those participants who did not change dietary behaviors with exposure to SNAP-Ed, African Americans were more likely than White participants to consume fruit juice and juice-flavored SSBs at a level above median consumption. Additionally, a higher proportion of African American participants decreased their consumption of whole grain pasta in response to SNAP-Ed compared to White participants. Future qualitative research should investigate African Americans' current perceptions of and experiences with the SNAP-Ed program in Louisiana. SNAP-Ed implementation should be tailored to reflect and address barriers to healthy eating in this population. Other nutrition education programs can apply similar methods to investigate equity in dietary behavior change outcomes by race. Additionally, there is likely a need to explore further the role that the LSU AgCenter's SNAP-Ed program could play in addressing barriers, including structural racism in African Americans' food environment.

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