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Using a Grocery List Is Associated with a Healthier Diet and Lower BMI Among Very High Risk Adults

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INTRODUCTION

In the United States today individuals face a myriad of daily food choices and a great deal of marketing. Shopping thus requires calculated trade-offs between taste, nutrition, price, and convenience. This may make it particularly difficult to eat nutritiously or maintain a healthy weight.

African-Americans and low-income individuals are at increased risk for poor diet, overweight and obesity.^{1–3} It is especially difficult to eat healthfully with barriers such as targeted marketing, or residing in an area with no access to healthy, fresh foods.^{4–8} Living in a food desert, or a geographic area with limited access to healthy foods, may cause “deprivation amplification,”⁹ whereby the multiple barriers (e.g., limited access to healthy options, targeted marketing, etc.) may exacerbate health risk because of the additional barriers faced by residents.

Grocery shopping with a list is one tool that may help people to navigate complicated food marketing environments.¹⁰ A shopping list can function as (1) a memory aid, (2) a guide to limiting impulse purchases, and (3) a formal planning method that structures meals and eating habits and preserves financial resources.^{11–14} For shoppers attempting to eat a healthy diet or limit calories, attending to a list may help filter out products and promotions that undermine these goals. Among low-income individuals, lists may be particularly effective at directing purchases if, after paying for all items on the list, there are little or no funds remaining to spend on discretionary items like snack foods and sweets.¹⁵ And for food deserts residents, lists might also optimize purchases during trips to distant, less frequently visited stores.

Prior studies employing a variety of designs and measures provide mixed evidence that using a list is associated with improved dietary quality or weight.^{16–19} Only one examined a high-risk population of low-income women with limited access to healthy foods.²⁰ In an analysis of households that were part of the national food stamp program survey, half used shopping lists “pretty much all the time” and those that did were significantly more likely to meet daily recommended dietary guidelines for certain nutrients.²⁰

Due to limited evidence, this research builds on the opportunity to examine a sample of low-income, predominantly African American household food shoppers residing in two urban food deserts to determine the characteristics of grocery list users and whether using a list was associated with a better diet and a healthier weight.

METHODS

Participants And Procedures

Data were collected as part of the Pittsburgh Hill/Homewood Research on Eating, Shopping and Health (PHRESH) study, a population-based longitudinal survey designed to improve understanding of the food shopping and dietary patterns of urban food desert residents. PHRESH participants were 1,372 adults who were the primary food purchasers for households sampled from two sociodemographically similar low-income predominantly African-American neighborhoods characterized by poor access to healthy food options such as fresh fruit and vegetables, both in the Pittsburgh area.

Households were enrolled and baseline surveys administered in summer and fall 2011 (May – December). Households were randomly selected from a complete list of neighborhood addresses obtained from the Pittsburgh Neighborhood and Community Information System (PNCIS), which had been merged with Allegheny County Office of Property Investment data to identify residential addresses. All residential addresses were cross-referenced with postal service data to remove vacant properties from the sample. Stratified random sampling was applied to the cohort within the intervention neighborhood (three concentric radii of distances to where the construction of a full-service supermarket was planned were sampled). There also was an oversampling of households in the ‘intervention’ neighborhood. Pre-notification postcards and letters were mailed to each selected address.

Eighteen trained data collectors who lived in the neighborhoods went door-to-door to enroll households. They were able to speak with an adult and identify the address as a residence for 1,956 households (67% of all selected addresses). Of those households, 1,649 were eligible (i.e. the study was able to contact the primary food shopper who was 18 years or older and cognitively and physically able to complete the interview); 1,434 (87%) agreed to do so. Of those who participated, 62 (4%) had large amounts of missing data, leaving a final sample of 1,372 household shoppers (70% of those with whom data collectors were able to speak).

Data collectors interviewed participants in their homes, entering data into a laptop computer. The survey assessed socio-demographic characteristics, including educational attainment, household income, employment status, marital status, food security, food shopping behaviors, and a variety of related factors around food purchasing. Residents self-administered sensitive questions (e.g., income). Interviewers measured respondent height and weight at the conclusion of the interview and guided respondents through a 24-hour online dietary recall. Approximately one week later, participants repeated this dietary recall via telephone. Participants gave their informed consent for the study and received \$25 for the initial survey (and dietary recall), and an additional \$15 for completing the second dietary recall. All study protocols were approved by the RAND Human Subjects Protection Committee. Analyses presented here use PHRESH baseline data, collected prior to

construction and opening of a supermarket that subsequently was introduced into the study areas.

Measures

Shopping with a list was measured with the question, “In general, how often do you go grocery shopping with a list of things you need to buy?” Response categories were “never,” “sometimes,” “often,” or “always.” Based on the distribution of responses and for ease of presentation, responses were dichotomized to create a group of users who responded that they always use a list versus inconsistent or non- list users (all others) for the analyses.

Diet was assessed with the ASA-24,²¹ a 24 hour recall designed for self-administration. Data collectors guided respondents through the recall, which is based on a modified version of the USDA’s Automated Multiple-Pass Method (AMPM). Healthy Eating Index-2005 scores were derived from the average of the two recalls unless participants completed only one (7% of participants).^{22–23} The HEI-2005 includes 12 components: total fruit, total vegetables, total grains, milk, and meat and beans, whole fruit, dark green and orange vegetables and legumes, whole grains, oils, saturated fat, sodium, and calories from “SoFAAS,” or solid fat, alcohol, and added sugar. HEI can range from 0 to 100, with higher scores indicating higher quality diet. Average HEI score in the United States is 57.2; for non-Hispanic blacks, 55.0.²³

BMI was based on interviewer measured height and weight (respondents were clothed but measured without shoes) May through September 2011. Interviewers measured height to the nearest eighth inch using a carpenter’s square (triangle) and an 8-foot folding wooden ruler marked in inches. Interviewers entered adjustments to the height—e.g., for shoes or hair ornaments that the respondent chose not to remove. Weight was measured using the SECA Robusta 813 digital scale to the nearest tenth of a pound.

Age, race, gender, education, adjusted household income, marital status, number of children in the household, and employment were measured using validated items from the United States Census/American Community Survey,²⁴ as well as the Los Angeles Family and Neighborhood Study (LAFANS)²⁵ and the Project on Human Development in Chicago Neighborhoods Community Survey (PHDCN).²⁶ Other factors that might confound relationships between list use and dietary quality or BMI were measured. Food security was assessed with the United States Household Food Security Module.²⁷ As an indicator of nutritional knowledge respondents were asked, “How many servings of fruit and vegetables are recommended for daily consumption?” Responses of “5 or more” were accepted as correct. Similar items have been validated in multiple studies, including one of a large sample of low-income African-American men.²⁸ Respondents also reported the number of people they typically purchase food for and how much they typically spend on food each week (both were open-ended). Weekly food expenditures were calculated as the amount spent per person. To measure attempts to limit calories, respondents were asked “In the past month, have you been eating fewer calories to lose weight or keep from gaining weight?”

Data Analysis

Descriptive statistics were calculated, including demographics, food security, and the primary predictor and outcomes (shopping with a list, BMI and HEI). Variation in these characteristics with respect to shopping with a list was tested using two-tailed t-tests for means and Chi-square for proportions. Two ordinary least square regression models tested whether a dichotomous indicator of always shopping with a list was associated with (1) dietary quality and (2) body mass index, after controlling for other factors. A second pair of models tested whether model results were robust to use of a continuous measure of list-use frequency. A post hoc Bonferroni correction was applied to each comparison between those who always shopped with a list and those who did not always shop with a list to assess whether associations remained statistically significant. All analyses were conducted using SAS software (version 9.2, SAS Institute Inc., Cary, NC, 2013).

RESULTS

The majority of the sample were African-American (91%) and reported a household income of less than \$20,000/year (80%). The average participant had a BMI of 30.6; the average score on the index of dietary quality was 48.9. Most participants were between 45 and 75 years of age (57%), 33% were employed, 70% were high school graduates or completed some college or technical school, 74% were female, 19% were married or living with a partner, and 27% had children in the household. Just under one-third (31%) of the sample reported that they “always” shop with a list, 17% said they “often” do so, 26% use a list “sometimes” and 26% “never.”

Table 1 compares characteristics of food shoppers who reported “always” using a shopping list with those who reported all other categories (“never,” “sometimes,” or “often”). Those who reported always using a list had significantly higher dietary quality. They were more likely to be female and older, and less likely to be employed or to have low or very low food security. After applying a Bonferroni correction, the marginal association between those who always used a list and BMI was eliminated, as well as the association between those who always used a list and knowledge of eating fruits and vegetables, and trying to eat fewer calories.

After controlling for these factors, dietary quality remained significantly higher among those residents who reported always using a list, by an average of 1.4 points (see Table 2). Adjusted r^2 of the model was .103. Other predictors of higher dietary quality included older age, having a college degree, knowledge of government recommendations of fruit and vegetable consumption, and trying to eat fewer calories.

In our adjusted model, the association between BMI and always using a shopping list became significant (see Table 3). Adjusted r^2 of the model was .095. List-shopping was associated with a lower BMI of 1 unit, equivalent to weighing an average of 5 fewer pounds for a person whose height is 5'5" (1.65 m). Being male was associated with a lower BMI. Having children in the household, knowing government recommended fruit and vegetable servings and trying to eat fewer calories were associated with a higher BMI.

The independent association between list use and dietary quality, and between list use and BMI, also were tested using the ordinal version of the list-use variable (i.e., never, sometimes, usually, always) in regression equations otherwise identical to those reported in Tables 2 and 3. Both associations remained significant: dietary quality beta = 0.59 (SE = .025), p = .02; BMI beta = -0.35 (SE = 0.17) p = .04.

DISCUSSION

Among this predominantly low-income African-American sample of food desert residents, most reported that they did not always shop with a list, but those who *did* had better dietary quality and lower BMI. Indeed, there appears to be a direct relationship between list use and these factors such that individuals who reported always shopping with a list had slightly better dietary quality and slightly lower weight status.

The frequency of list use observed appears somewhat lower than that obtained by Hersey et al., who found 50% of National Food Stamp Program Survey (NFSPS) participants used a shopping list “pretty much every time” and 25% of Expanded Food and Nutrition Education Program (EFNEP) Evaluation/Reporting System (ERS) participants “almost always” used a shopping list,²⁰ while the present study found that 17% “often” and 31% “always” used a list. Direct comparison is difficult given the rough, and different, response categories used across studies.

Associations between list use and nutrition obtained herein are consistent with others. A similar study found that low-income shopping list users were more likely to meet Recommended Daily Allowances (RDAs) for a few key nutrients. Our work extends these findings and those of other prior studies¹⁶⁻¹⁷ to the very high risk, high priority population of low-income African-American U.S. food desert residents. This study also expands these prior studies to show associations between list use and BMI.

While the exact mechanism through which lists are associated with a lower weight and better diet are speculative, it is possible that a shopping list acts as a shield against the availability of unhealthy foods and also may limit impulsive choices. People experience diminished self-control as the number or difficulty of decisions made increases.²⁹⁻³⁰ Shopping with a predetermined list of items spreads the number of decisions made over different conditions (e.g., at home where the list is constructed, at the market when shopping), conserving self-regulatory energy. Such an aid may be even more important for low-income individuals because they have less discretionary spending and need to make more complicated trade-offs between price and nutrition. This would be consistent with a recent UK-based qualitative study that explored how 26 residents of a low-income area made food shopping decisions. Shoppers who used an “item by item” or “restricted and budgeted” approach, including behaviors such as shopping with a list or pre-planning purchases, relied less on in-stores cues and were more successful at constraining their food choices to match their health and/or financial values.¹⁵

While it is tempting to conclude that using grocery lists leads to healthier eating and lower weight, the cross-sectional nature of the data and analysis in this study does not allow for

casual inference. It is equally, if not more likely, that individuals with healthier eating habits and healthier weights more often choose to shop with lists. Using a list may reflect conscientious personality,³¹ a trait that also might lead to greater attention to nutrition and a healthy weight. Results also cannot be generalized to higher income households or to people who do not live in a food desert. Finally, if lists function differently in different seasons, results may not generalize to January through April, as data were not collected in these months. However, results did not change when season was controlled for in ancillary models. Future research also should address use of shopping lists in higher income households and those not living in food deserts.

IMPLICATIONS FOR RESEARCH AND PRACTICE

More frequent use of a shopping list was associated with a better quality diet and slightly lower weight among high-risk, low income individuals living in a food desert. Further research is needed to address whether lists exert a causal influence, but the existence of these associations in a population much in need of effective interventions is promising. A shopping list may serve as a useful, easy to implement and practically no-cost tool to support food purchasing consistent with healthier eating and healthier weight.

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Table 1

Socio-Demographic Characteristics of Persons Who Do And Do Not Always Shop With a List, And Their Comparison, Employing Two-Tailed T-tests and Chi-Square Tests

Characteristics	Always shops with a list N=424	Doesn't always shop with a list N=948	P
Mean age (years)	57.0	52.4	<0.001*
Female	80.0%	71.4%	0.001*
African American	88.6%	91.4%	0.252
College degree	16.3%	14.9%	0.506
Adjusted Household income (USD)	\$13,144	\$13,518	0.626
Employed	27.3%	35.4%	0.003*
Families with children	25.2%	27.9%	0.314
Married or Living with a partner	19.4%	18.2%	0.609
Weekly food expenditures per person feeding (USD)	\$37.50	\$36.60	0.580
Mean BMI (kg/m ²)	30.1	30.8	0.084
Mean HEI score	50.3	48.2	0.001*
Food insecure	26.0%	34.3%	0.002*
Knowledge of eating 5+ servings of fruits/vegetables per day	24.5%	19.4%	0.035
Trying to eat fewer calories in past month	38.4%	32.7%	0.039

For each variable, we looked at the mean for those participants who always shop with a list and those respondents who do not always shop with a list. We then tested for statistically significant differences using two-tailed t-tests for means and Chi-square for proportions.

* Indicate significance after applying a Bonferroni correction for the 14 tests conducted, resulting in a cut-off of $p < .0035$ for significance (i.e., $p < .05/14 = p < .0035$)

Table 2

Predicting Dietary Quality With Shopping List Use Among Low-Income Predominantly African-American Shoppers: Ordinary Least Square Regression Model of The Associations Between Sociodemographic Characteristics, Shopping With a List, and Dietary Quality (n=1344)

Variables	β coefficient	Standard Error	95% Confidence Intervals	Pr > t
Intercept	39.54	1.35	36.88, 42.19	<.001**
Always Shops with List	1.42	0.62	0.20, 2.64	0.022*
Age	0.11	0.02	0.08, 0.15	<.001**
Male	-0.38	0.67	-1.70, 0.93	0.569
Adjusted Household Income/1000	0.05	0.02	0.00, 0.10	0.036*
College degree	3.81	0.82	2.21, 5.42	<.001**
Married	0.14	0.73	-1.29, 1.57	0.851
Any children in household	0.23	0.79	-1.32, 1.77	0.775
Food Insecure (Low/Very Low Security)	-0.45	0.63	-1.69, 0.78	0.472
Know 5+ Servings/Day	2.76	0.71	1.36, 4.16	<.001**
Trying to eat fewer calories	3.18	0.60	2.00, 4.37	<.001**

We employed an ordinary least square regression model where dietary quality (Healthy Eating Index) was the dependent variable, always shopping with a list was the independent variable of interest, and covariates included age, sex, adjusted household income, college degree, being married, children in the household, food insecurity, knowledge of fruit and vegetable serving recommendations, report of trying to eat fewer calories per day.

Adjusted $r^2 = .103$

*
p<.05

**
p<.005

Table 3

Predicting Body Mass Index (BMI) With Shopping List Use Among Low-Income Predominantly African-American Shoppers: Ordinary Least Square Regression Model of The Associations Between Sociodemographic Characteristics, Shopping With a List, and BMI (n=1344)

Variables	β coefficient	Standard Error	95% Confidence Intervals	Pr > t
Intercept	29.73	0.94	27.89, 31.57	<.001**
Always Shops with List	-0.99	0.43	-1.83, -0.14	0.022*
Imputed: Age	-0.004	0.01	-0.03, 0.02	0.780
Male	-2.01	0.46	-2.92, -1.10	<.001**
Adjusted Household Income/1000	-0.01	0.02	-0.05, 0.02	0.474
Education	-1.38	0.57	-2.50, -0.26	0.016*
Married	0.38	0.50	-0.61, 1.37	0.448
Any children in household	2.01	0.55	0.93, 3.08	<.001**
Food Insecure (Low/Very Low Security)	0.50	0.43	-0.35, 1.36	0.249
Know 5+ Servings/Day	1.13	0.50	0.15, 2.10	0.024*
Have Been Eating Fewer Calories	3.63	0.42	2.81, 4.46	<.001**

We employed an ordinary least square regression model where Body Mass Index (BMI) was the dependent variable, always shopping with a list was the independent variable of interest, and covariates included age, sex, adjusted household income, college degree, being married, children in the household, food insecurity, knowledge of fruit and vegetable serving recommendations, report of trying to eat fewer calories per day.

Adjusted $r^2 = .095$

*
p<.05

**
p<.005