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Knowledge, barriers, and stage of change as correlates of fruit and vegetable consumption among urban and mostly immigrant black men

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Abstract

Background—Daily fruit and vegetable (FV) consumption in black men is low and has remained relatively unchanged over the past 20 years.

Objective—To examine awareness of FV recommendations promoted by federal agencies and correlates of FV consumption among an urban and mostly immigrant population of adult black men.

Design—A cross-sectional study analyzing baseline data (n = 490) from a randomized controlled trial.

Setting—A large healthcare worker's union.

Main outcome measures—Knowledge, perceived benefits, stage of readiness, perceived barriers, and daily servings of FV intake.

Statistical analyses performed—One-way analysis of variance and t-tests were used to compare FV intake across main study variables. Regression analysis was used to identify independent predictors of FV intake.

Results—FV intake was low (mean: 3 servings/day). Ninety-four percent were not aware that men should consume at least 9 servings of FVs daily and 59.8% were not aware that eating a colorful variety is important. In contrast, over half (54.7%) were aware that a single serving is equal to about a handful; 94.1% correctly reported FVs as an important source of fiber; 79.6%

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correctly reported vitamin pills were not a substitute for eating FVs; and 94.5% recognized that there are health benefits to eating FVs, although identification of specific benefits was minimal. In regression analysis, a greater level of FV consumption was significantly associated with greater knowledge of FV recommendations, lower perceived barriers, and a more advanced stage of change (action versus contemplation/preparation). Perceived health benefits were not associated with FV consumption.

Conclusions—There is a lack of awareness of the current FV recommendations. Further, men reported FV intakes that were far below national recommendations. Greater efforts are needed to help urban and primarily immigrant black men to realize the importance of and recommendations for FV consumption.

Keywords

black men; fruits and vegetables; immigrant population

INTRODUCTION

Compared with other racial groups, black men have higher age-adjusted incidence and mortality rates for many diet-related diseases, including high blood pressure [1–3], cardiovascular disease [1], type II diabetes [1,4], obesity [1,3], and some cancers [5,6]. Epidemiologic data suggests that consuming a diet rich in FVs may lower risk for chronic diseases [7–15]. Various dietary components found in FVs, including vitamins, minerals, and fiber, appear to play a role in disease prevention, but the combination of the various nutrients and phytochemicals offers the greatest health benefits [16–17].

Daily FV consumption in men is low, particularly in black men [18–21], with non-Hispanic blacks less likely to meet the United States Department of Agriculture (USDA) Dietary Guidelines for Americans than non-Hispanic whites [19]. Trend data suggest that FV consumption in the U.S. has remained virtually unchanged between 1988 and 2002 with an average intake of three FV servings per day for adults [19].

In 2003, the National Cancer Institute (NCI) launched the “Shoot for 9” campaign to get black men to eat at least 9 daily servings of FVs [22]. This campaign was recently folded into a new federal initiative, “Fruit and Veggies: More Matters” [23]. The new initiative incorporates the 2005 USDA Dietary Guidelines [24] recommending that adult men eat a minimum of nine daily servings of FV (4.5 cups), with a range from nine to 13 servings (4.5 – 6.5 cups) depending on caloric intake and physical activity level. Messages from these various federal agencies are similar in that they emphasize the importance of eating at least nine daily servings of FVs, choosing a colorful variety, a focus on whole foods (not supplements) to provide the combination of nutrients for greatest health benefits, and the potential health benefits associated with a diet rich in FVs.

The primary objectives of this study were to better understand the extent to which a sample of urban and mostly immigrant black men are aware of current FV recommendations being promoted by federal agencies. A secondary objective was to examine whether men’s knowledge, perceived health benefits, perceived barriers, and stage of readiness to change are related to their reported FV consumption. According to the Health Belief Model [25], knowledge, perceived benefits and barriers, should predict FV consumption, and according to the transtheoretical model of change [26], so should stage of readiness to change. Not much is known about correlates of FV consumption in urban or immigrant black male populations living within the U.S. In other populations, knowledge [27–35], attitudes or beliefs [27,31,35–38], and barriers [27,28,34,36,39,40] have been shown to be relatively strong correlates of adult FV consumption. Stage of change, or the extent to which a person

has considered or taken action to increase FV consumption, has been an inconsistent correlate of FV consumption [28,30,36,41–47]. The findings from this study have the potential to inform interventions designed to enhance FV consumption in urban and immigrant black men.

METHODS

Design

This paper is an analysis of the baseline survey data from an ongoing randomized controlled trial, the Cancer Awareness and Prevention (CAP) trial. The baseline data were collected prior to randomization to one of the two arms of the trial, which included tailored, telephone education to promote either (1) informed decision-making about prostate cancer testing or (2) awareness of and adoption of national dietary recommendations for FV consumption. Participants received \$10 cash or a \$10 gift card for completing the baseline survey.

Setting and Participants

The sample consisted of American- and foreign-born men of African descent [48] who were participating in a randomized controlled trial. This population is at risk for many chronic health problems [49–51] which may be influenced by diet. The sampling frame was constructed from the beneficiaries list of a large health care workers union comprising approximately 355,000 beneficiaries in the New York City metropolitan area. All of these individuals had health insurance coverage through the union's health benefit fund. Inclusion criteria required that all participants be between the ages of 45 and 70 years and self-report as "black," "African American," "Caribbean," and/or "African." A unique strength of this study is that this population had many black men from the Caribbean. Despite the rapid increase in Caribbean immigrants to the U.S. in the past few decades (and almost one-third of New York's black population), little is known about their awareness of the importance of and recommendations for FV intake. Exclusion criteria included a prior diagnosis of prostate cancer, a prostate cancer test within the past 12 months, and stated intention to travel or to be unreachable by telephone for follow-ups. Between 06/06/05 and 07/01/07, 1,777 individuals were telephoned and assessed for eligibility. Of these, 1153 (64.9%) were ineligible, 134 (7.5%) refused after eligibility was confirmed, and 490 (27.6%) were eligible and completed the baseline survey. The main reasons for ineligibility were that participants had been screened for prostate cancer in the previous 12 months (32%), were not black or African-American (19%), did not speak English (18%), and did not regularly use insurance from the health benefit fund (16%). The study was approved by the relevant Institutional Review Boards at Temple University and Columbia University and informed consent was obtained from all participants.

Data Collection and Measures

Trained interviewers used a structured, telephone interview to collect data. Interviews were audio-recorded and monitored by supervisors to maintain quality control. Supervisors performed quality ratings on two-thirds of all interviews using a 10-point rating form that assessed a range of interviewer behaviors, including accuracy of questioning and data recording, interview pace, and responsiveness to respondents' questions. Eighty-four percent of the checked interviews scored 9 (90%) or better. During the formative evaluation phase of this research, the survey materials were subject to a variety of techniques to reduce response error, including cognitive interviewing [52] and readability tests. Thirty-five men from the target population were enrolled to assist with the formative evaluation. Cognitive interviewing techniques included probes that assessed comprehension (e.g., "In your own words, what is this question asking?"), ease of item recall (e.g., "Can you repeat back to me the question I just asked?"), difficulty level (e.g., "How difficult was it to answer this

question?”), and how men were processing questions (e.g., “What did you think about when answering this question?”). Responses were reviewed and used to inform revisions of the survey. A Simple Measure of Gobbledygook (SMOG) [53,54], a commonly used formula to assess the readability of health care messages for low literacy populations, was used to assess readability of the preliminary survey questions. The SMOG analysis helped to determine readability and to identify ways to modify the survey so that it resulted in a 7th grade readability score.

Social and demographic variables—The survey measured age, marital status, education, and immigrant status. For marital status, participants were asked whether they were married or living with someone in a marital-like relationship. For education, participants were asked what was the highest grade or year of school that they completed. For immigration status, participants were asked to identify the country, nation, or island where they were born.

Knowledge of federal guidelines pertaining to FVs—Knowledge of guidelines was measured using five items that reflect core messages from federal health agencies [22,24,55]. The first two items were: “Would you say that a single serving of beans is ‘more’, ‘less’, or ‘about as much’ as can fit in the palm of your hand?” (correct response = about as much) and “Would you say that health experts recommend that men eat ‘1 – 4’, ‘5 – 8’ or ‘9 or more’ servings of FVs every day?” (correct response = ‘9 or more’). The next three items used an agree/disagree response format. The items were: “If you take vitamin pills, you do not have to eat a lot of FVs.” (correct response = disagree); “As long as you eat FVs, it does not matter what color they are.” (correct response = disagree); “FVs are a good source of fiber.” (correct response = agree). Correct responses were summed to create a total knowledge score (range: 0 – 5).

Perceived benefits—Respondents were asked, “Do you think there are any health benefits from eating a lot of FVs?” Men who answered affirmatively, were probed for specific health benefits. Responses were coded into the following categories: lowers chances for heart disease, stroke, blood pressure, diabetes, cancer (all or specific types), and helps to lose/maintain weight. All mentions of one of the above six health benefits were summed to create a total health benefits score (Range 0 – 6). Other named benefits (e.g., clear skin) were documented, but were not included in this analysis as they were not considered to be among key health benefits provided by FV consumption [22,24,55].

Perceived Barriers—Barriers to FV consumption were measured using a 14-item index adapted from Steptoe et al. [32,56]. A similar version of this measure has been used to document the effects of a behavioral and nutrition education intervention in a low-income urban population with a Cronbach’s alpha coefficient of 0.78 for perceived barriers [30]. Six items referred to specific barriers to fruit consumption (“Does it take a lot of time to prepare fruit?” “Do you mostly eat fruit when someone else prepares them for you?” “Do you like fruit?” “Does your family like fruit?” “Do you usually have fruit in the house?” “Can you usually get fruit when you eat outside of your house?”). An identical six items referred to barriers to vegetable consumption. Two additional items referred to barriers to both FV consumption (“Is it easy for you to get good quality FVs?” “Do FVs cost too much for you to buy regularly?”). Responses (yes/no) were scored such that a higher number indicated more barriers. Scores could range from 0 to 14.

Stage of Readiness for Change—Stage of readiness for change to eat more FVs was measured using the stage of readiness for change measure. This measure has been used to document the effects of a behavioral intervention to increase FV intake on stage of readiness

to change in a low-income population [57]. The measure poses a series of questions corresponding to four stages were used: Precontemplation (“No” to “Have you ever thought about eating more FVs?”), Contemplation (“Yes” to “Have you ever thought about eating more FVs?”), Preparation (“Yes” to “Are you thinking about making an effort to eat more FVs in the next month?”), and Action (“Yes” to “Are you currently making an effort to eat more FVs?”). This measure was based on Prochaska’s stage of change concept [58].

Fruit and Vegetable consumption—Fruit and vegetable consumption was measured using a three-item food frequency questionnaire that was adapted from Steptoe et al. [59]. The original measure has been used successfully in an urban, low-income population [32,59] and has been validated using biomarkers [60]. In the validation study, reported number of servings of FVs consumed was significantly and positively correlated with plasma ascorbic acid, total daily potassium excretion, and potassium-creatinine ration [60]. The adapted three items assessed how many servings of fruit, how many servings of potatoes, and how many servings of other vegetables participants consumed on the previous day. Each question was followed by examples of a serving for that item. For fruit: “Think about yesterday. How many servings of fruit did you eat? An example of a serving of fruit is a medium apple, a small glass of fruit juice, or a handful of cut-up fruit.” For potatoes: “Think about yesterday, how many servings of potatoes did you eat? Include baked, mashed, or French-fried. An example of a serving of potatoes is a small sweet potato or yam, or a handful of cut-up potatoes.” For other vegetables: “Think about yesterday. Not including potatoes, how many servings of other vegetables did you eat? An example of a serving of vegetables is a small salad or a handful of cooked beans or cut-up vegetables.” Number of servings for the three items was summed to create a total estimate of FV servings per day.

Statistical Analysis

One-way analysis of variance and Tukey’s Honestly Significant Different (HSD) post-hoc comparisons were used to compare FV consumption across levels of knowledge, perceived barriers, and stage of change. An independent sample t-test was used to compare FV consumption across levels of perceived health benefits. Due to small sample sizes in several categories, the variable ‘perceived health benefits’ was dichotomized (mentioned 0 health benefits versus mentioned 1 – 6 health benefits) and the variable ‘stage of change’ was trichotomized (precontemplation, contemplation/preparation, and action) for analyses. Linear regression analysis was used to determine which factors were associated with the FV consumption when all of the variables were entered into the model. The square root of FV consumption was used due to its positive skew. All statistical analyses were conducted using two-tailed tests with a p-value of <0.05 to convey significance. Analyses were performed using SPSS for Windows (version 15.0, release 15.0.0, September 6, 2006, Chicago, Illinois).

RESULTS

Table 1 presents the characteristics of the population. The sample consisted of mostly middle-aged (mean, M (standard deviation, SD): 55 (6.3) years) and married black men. The majority of men were immigrants, primarily from the Caribbean (62.7%). Nearly one-third had less than a high school education. The mean number of reported daily FV servings was low (M(SD): 3.1(2.2), but approximately two-thirds of participants reported being in the action stage (currently trying to eat more FVs).

Table 2 shows level of knowledge about FV recommendations from federal agencies. Less than 6% of the men knew the recommendation to eat 9 or more daily FV servings. Over half incorrectly reported that FV color was unimportant. In contrast, over half correctly reported

one serving as being equal to a handful, over three-fourths correctly disagreed that vitamins were not a good substitute for FVs, and almost all correctly agreed that FVs were a good source of fiber.

Nearly all participants reported that there were health benefits to eating FVs. However, most were not able to name a specific health benefit. The most commonly reported benefits were the potential to lower chances of heart disease or cholesterol, help lose or maintain weight, and reduce cancer risk. Men rarely mentioned the potential for FVs to lower chances of diabetes, stroke, and high blood pressure.

Overall, the number of reported perceived barriers was low (median=2.0). As shown in Table 3, the main barrier reported was that FVs were consumed only when someone else prepared them. The next most frequently reported barriers included not being able to get FVs when eating out and the cost. Men rarely reported a low likeability, not having FVs in the house, preparation time, and access to good quality fruits and vegetables as barriers.

Table 4 shows differences in FV consumption in relation to total knowledge score, knowledge about recommended FV servings per day, perceived benefits, stage of change, and perceived barriers. Fruit and vegetable consumption was related to total knowledge ($F(2,467) = 3.40, p < .05$) and specific knowledge about recommended servings ($F(2,460) = 6.48, p < 0.01$). In both cases, greater knowledge was associated with greater FV consumption. Fruit and vegetable consumption was also related to stage of change [$F(2,474) = 5.26, p < .01$] and perceived barriers [$F(4,73) = 3.35, p < 0.01$]. Specifically, FV was greatest in men who were in the action stage of change (versus contemplation/preparation) and reported relatively few barriers. There was no association between being able to identify potential health benefits and FV consumption ($t(477) = -1.28, p > 0.10$).

Regression analysis revealed that when all variables (age, education, marital status, immigrant status, level of knowledge, perceived health benefits, stage of change, and perceived barriers) were entered into the model, level of knowledge ($\beta = 0.11, t(456) = 2.44, p < 0.05$), stage of change ($\beta = 0.13, t(456) = 2.93, p < 0.01$), and perceived barriers ($\beta = -0.19, t(456) = -4.20, p < 0.001$), remained significantly associated with FV consumption; demographic characteristics and perceived health benefits were not associated with FV consumption. All of these variables entered into a single regression model accounted for 6.3% of the variance in fruit and vegetable consumption (Overall model: Adjusted $R^2 = 0.063, F(8,457) = 4.89, p < 0.001$).

DISCUSSION

This study showed FV consumption is low in a sample of urban and mostly immigrant black men, despite the surprisingly large proportion of participants reporting that they were currently making efforts to eat more FVs. Knowledge about federal FV recommendations also was low: the majority of men did not know the recommendations to consume at least 9 daily servings of FV or that eating a colorful variety of FVs are important. Conversely, many participants were aware that: a single serving of a FVs are equal to a handful, that FVs are an important source of fiber, and that vitamin pills are not a substitute for FV. Many men reported that there are potential health benefits to eating FV, but few could identify specific benefits. The main reported barrier to eating FV was dependence on someone else to prepare them. The results also showed that greater FV consumption was associated with greater knowledge of FV recommendations, lower reported barriers, and an active stage of readiness to change (versus contemplation/preparation), but was not related to perceived health benefits.

Perhaps most striking was that 90.1% incorrectly reported daily FV recommendations to be either 1 – 4 servings per day (65.3%) or 5 – 8 servings per day (24.8%). This is problematic because even though a high proportion of men reported that they intended to eat more FVs, they are underestimating how much they need to eat in order to achieve the recommended amounts. It is not clear if this population was ever exposed to education campaigns associated with the federal guidelines such as those promoted by the NCI (e.g., 9-A-Day) and the USDA (e.g., MyPyramid.gov). Federal agencies have relied mostly on national radio spots, brochures, and the Internet to communicate their recommendations. One of these campaigns (i.e., the 9-A-Day) took extra efforts to target black men. Despite these efforts, the data suggest that many of these messages are not reaching high risk men such as those sampled in the study. For older, inner-city, and immigrant male populations, it may be necessary to get messages out in other venues, including community centers, the workplace, doctor's offices, grocery stores, buses and subways.

Also noteworthy was that over half of the men reported that choosing FVs of different colors does not matter. Current federal guidelines stress eating FVs of different color to get the broadest range of nutrients [24] and include specific recommendations for dark green and orange vegetables [24]. The importance of eating a colorful variety of FVs is an important message that is being missed by this population.

The results of this study showed that a higher level of knowledge about FV recommendations was associated with 23.8% higher FV consumption. Similar results have been reported in studies with different populations [27–35]. Taken together, these findings suggest that interventions and public health campaigns that emphasize increasing knowledge of federal recommendations may help to increase FV consumption. It should be noted that the amount of recommended daily FVs have recently been changed from 'servings' to 'cups' (4.5 to 6.5 cups per day versus 9 to 13 servings per day) because it is thought to be easier for people to relate to amounts in household measurements rather than as serving sizes. In the formative evaluation phase of this survey, it was quickly learned that men were unfamiliar with the 'cup' as a unit of measurement, possibly because they seldom prepare foods or follow recipes. Thus, 'handful' instead of 'cup' was used and it was found that the majority of men were aware that a single serving was about equal to a handful. It is doubtful as to whether awareness of the concept of 'cups' will be an effective method of increasing servings in this population.

Moser et al. [39] recently reported that beliefs in positive psychological and physiological outcomes, such as losing or maintaining weight, were significant predictors for fruit, but not vegetable, consumption in men. In the present study, perceived health benefits was expected to be significantly associated with higher FV consumption, but was not statistically significant. Additional analyses attempted to replicate Moser's findings with respect to fruit consumption, but did not find a significant association. Despite nearly all (92.3%) men believing that there were health benefits to eating FV, only 27.8% could actually identify at least one health benefit promoted by federal agencies.

In this sample of men, the main reported barrier was that they only consumed FVs when someone else prepared them. These findings suggest that interventions to promote FVs in men may need to ensure there is support from the household member that does the majority of shopping and food preparation. Less common barriers included cost of FVs and difficulty getting FV when eating out. These findings are not surprising because snack and unhealthy foods are relatively inexpensive compared to fresh produce in the U.S. [62].

Although there was an expected increase in FV consumption between participants in the action stage of change compared to the contemplation/preparation stage of change, it was

somewhat surprising that there was no difference in FV consumption between participants in the precontemplation stage of change versus those in the action stage of change. It is possible that participants not thinking about eating more FVs believe they are already eating enough. It is important to reiterate that nearly all (98.2%) of the participants in this study were not eating the recommended amount of FVs, even those that reported to be in the action stage. The large number of men reporting to be in the action stage of change were due, in part, to the staging measure used. The staging variable was not based on their reported FV intake, but rather whether or not the participant reported having ever thought about eating more FVs, was thinking about eating more FVs in the next month, or was currently making efforts to eat more FVs. Thus, there were many more men that reported making an effort to eat more FVs than were actually consuming FVs at the recommended level of 9 or more servings per day. Regardless, these data suggest a great disconnect between knowledge, motivation, and men's likelihood of eating the recommended amount of FVs.

This study has several limitations. First, the results may not generalize to a more broadly representative sample of black men in the U.S.. The sample was, however, similar to national estimates with respect to education levels [63] and reported daily intake of FVs [19]. A second limitation is the reliance on a short self-report measure of FV consumption on a single day. As this study of FV consumption was part of a larger randomized controlled trial on prostate cancer education, measurement burden on participants had to be minimized. Further, our measure was based on one that has been validated in other studies using similar populations [32,59,60] and revealed levels of intake consistent with other studies that have used more intensive measures [19]. A third limitation is the cross-sectional nature of the data, thus, causal relations cannot be inferred. A fourth limitation is that the overall amount of variance explained by the regression model was relatively small. This may be due, in part, to the limited assessment of relevant variables in our theoretical models. For example, beliefs about benefits was not predictive of FV consumption in this study, but, as suggested by the Health Belief Model [46], perceived benefits may be most predictive of outcomes among people who also perceive that they are susceptible to health risks or are able to perform the health behavior. Perceived susceptibility or self-efficacy, among other variables, that are components of the theoretical models were not assessed. If they were, the models may have accounted for more variance. Future studies should take a more comprehensive approach in order to fully test the theoretical models. In addition, the literature suggests other novel constructs may be predictive as well, including social support [27,28,43], autonomous motivation [36], anticipated regret [32,64], and neophobia [27].

Conclusions

The findings from this study are timely given the launch of the Fruit and Veggies – More Matters initiative [23]. This new initiative promotes a minimum of 4 1/2 cups (9 half-cup servings) for adult men, emphasizes eating FV of different colors, focuses on whole foods versus supplements, and describes key health benefits including links with chronic diseases. The current study suggests that great efforts will be needed to help urban and primarily immigrant black men to realize the importance of and recommendations for FV consumption. It is anticipated that many new programs will be developed promoting the Fruit and Veggies – More Matters messages. These results have potential implications for public health interventions in that they suggest that targeting factors such as knowledge about recommended FV servings, emphasizing the importance of color and variety, increasing knowledge of health benefits, and ensuring there is support from the household member that does the majority of shopping and food preparation, may be important areas to target in urban and primarily immigrant black men. The lack of awareness of the current

dietary recommendations related to FVs is alarming and implores health experts to rethink how messages about diet and nutrition can reach this population.

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Table 1

Characteristics of study sample of urban and mostly immigrant black men (n = 490)

Variable	Number reported (%)
Immigrant Status	
Foreign Born	407 (83.1)
American Born	83 (16.9)
Married or Co-habiting	
Yes	410 (83.7)
No	78 (15.9)
Missing	2 (0.4)
Education	
Less than High School	153 (31.2)
High School or equivalent	156 (31.8)
Some College	111 (22.7)
College graduate or beyond	70 (14.3)
Stages of Readiness for Change	
Precontemplation	86 (17.6)
Contemplation	19 (3.9)
Preparation	44 (9.0)
Action	339 (69.2)
Missing	2 (0.4)
Reported daily fruit and vegetable intake^a	
< 5 daily servings	383 (80.0)
5 – 8 daily servings	87 (18.2)
9 or more daily servings	9 (1.8)

^a n = 479 due to missing data

Table 2

Responses to knowledge items about federal dietary guidelines^a related to fruit and vegetable consumption in urban and mostly immigrant black men (n = 490).

Knowledge items about guidelines	Number reported (%)
1. Health experts recommend that men eat:	
1 – 4 servings/day	323 (65.9)
5 – 8 servings/day	122 (24.9)
9 or more servings/day *	29 (5.9)
Don't know or refused	16 (3.3)
2. A single serving of beans is:	
More than can fit in the palm of your hand	108 (22.0)
Less than can fit in the palm of your hand	106 (21.6)
About as much as can fit in the palm of your hand *	268 (54.7)
Don't know or refused	8 (1.6)
3. If you take vitamins, you do not have to eat a lot of fruit and vegetables:	
Agree	82 (16.7)
Disagree *	390 (79.6)
Don't know or refused	18 (3.7)
4. As long as you eat fruit and vegetables, it does not matter the color they are:	
Agree	283 (57.8)
Disagree *	196 (40.0)
Don't know or refused	11 (2.2)
5. Fruit and vegetables are a good source of fiber:	
Disagree	21 (4.3)
Agree *	461 (94.1)
Don't know or refused	8 (1.6)

^aBased on NCI and USDA dietary guidelines pertaining to fruit and vegetable intake

* Indicates the correct response for knowledge items

Table 3

Barriers to fruit and vegetable consumption in urban and mostly immigrant black men

Barrier	n, (% reported as a barrier)
1. Do you like fruit? ^{ac}	11 (2.2)
2. Does your family like fruit? ^{ad}	19 (3.9)
3. Usually have fruit in the house? ^{ac}	26 (5.3)
4. Can get fruit when you go out to eat? ^{ae}	79 (16.3)
5. Only eat fruit when someone else prepares it? ^{bc}	180 (36.8)
6. Takes a lot of time to prepare fruit? ^{bd}	42 (8.6)
7. Do you like vegetables? ^{ac}	20 (4.1)
8. Does your family like vegetables? ^{af}	32 (6.6)
9. Typically have vegetables in the house? ^{ac}	11 (2.2)
10. Can get vegetables when you go out to eat? ^{af}	65 (13.4)
11. Only eat vegetables when someone else prepares it? ^{bd}	260 (53.4)
12. Takes a lot of time to prepare vegetables? ^{bc}	51 (10.4)
13. Is it easy to get good quality fruits and vegetables? ^{ad}	49 (10.1)
14. Do fruits and vegetables cost too much? ^{bg}	77 (15.8)

^a% who did not answer yes to this item

^b% that answered yes

^cn = 489 due to missing/refused items

^dn = 487 due to missing/refused items

^en = 485 due to missing/refused items

^fn = 486 due to missing/refused items

^gn = 488 due to missing/refused items

Table 4

Differences in reported daily total fruit and vegetable intake across categories of knowledge, health benefits, stage of change, and barrier scores in urban and mostly immigrant black men.

Predictor	Total fruit and vegetables Mean (Standard deviation)
<u>Total Knowledge Score</u> *	
0 – 2 (n = 180)	2.90 (1.81) ^a
3 (n = 182)	3.18 (2.12) ^{ab}
4 – 5 (n = 108)	3.59 (2.81) ^b
<u>Knowledge about Recommended Daily Fruit and Vegetable Servings</u> **	
1–4 servings/day (n = 316)	2.94 (1.99) ^a
5–8 servings/day (n = 120)	3.50 (2.13) ^b
9 or more servings/day (n = 27)	4.26 (3.82) ^b
<u>Perceived Health Benefits (Number mentioned, maximum 6)</u>	
Mentioned 0 (n = 339)	3.1 (2.09)
Mentioned 1–6 (n = 140)	3.3 (2.43)
<u>Stage of Change</u> **	
Precontemplation (n = 83)	2.96 (2.10) ^{ab}
Contemplation/preparation (n = 61)	2.39 (1.80) ^a
Action (n = 333)	3.34 (2.27) ^b
<u>Perceived Barriers (Number reported, maximum 11)</u> **	
0 (n = 99)	3.35(1.78) ^{ab}
1 (n = 104)	3.54 (2.10) ^a
2 (n = 135)	3.23 (2.76) ^{ab}
3 (n = 73)	2.74 (1.74) ^{ab}
4+ (n = 67)	2.48 (1.90) ^b

^{a, b} Tukey Honestly Significant Difference post-hoc comparisons: means in a column without a common letter are significantly different at the $p < 0.05$ level.

Significance level for T-test or Analysis of Variance:

* $P < 0.05$;

** $P < 0.01$;

*** $P < 0.001$