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The importance of the social environment in achieving high levels of physical activity and fruit and vegetable intake in African American church members

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Abstract

Purpose.—African Americans (AA) experience high burden of chronic diseases and cancers that are prevented and ameliorated with physical activity (PA) and fruit and vegetable (FV) intake. The purpose of this study is to identify individual, social and neighborhood variables associated with AA attaining high levels of both behaviors.

Design.—Cross-sectional analysis.

Settings and Subjects.—Cohort of AA adults recruited from Black churches in the greater Houston area.

Measures.—Self-administered questionnaires collected in 2012 assessed correlates and behavioral outcome variables (PA and FV consumption). A combined 4-category behavioral outcome was created: high PA/high FV, low PA/ high FV, high PA/low FV, and low PA/low FV.

Analysis.—Standard and stepwise multinomial logistic regression examined the association between the various variables and the behavioral outcome.

Results.—This sample (n=1009) had a mean age of 49 years, was mostly female, and obese. Compared to the low PA/low FV intake group, the high PA/high FV intake group had significantly lower odds of individual-level variables (worrying about getting cancer, perceived stress, loneliness, financial strain) and higher odds of social-level variables (social status, social cohesion, social organizations, and social norms). Only social-level variables remained significantly associated with higher odds of high PA/high FV intake in stepwise regression.

Conclusion.—These findings indicate that social influences may be most critical for high PA and FV intake in AA adults.

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Introduction

African Americans experience a higher burden of chronic disease and lifestyle-related cancers compared to Non-Hispanic Whites and even other racial/ethnic groups.[1–3] It is well known that several types of cancers and chronic disease can be prevented and ameliorated with high levels of physical activity (PA) and healthy diets with plentiful fruits and vegetables (FV).[4–6] However, most African Americans currently meet neither PA nor FV intake guidelines.[7,8] Research has emerged that health behaviors cluster together, including PA and FV intake,[9–12] and thus interventions targeting both these behaviors simultaneously could produce greater effects on cancer and chronic disease prevention than those focusing on each behavior alone.[13] However, there is minimal research on the clustering of these and other health behaviors in African Americans.[14–16] Research is needed in this area to drive the development of cancer and chronic disease prevention interventions in African Americans that focus on these two critical behaviors.

Understanding factors that facilitate the successful performance of ideal health behaviors within a specific community can help practitioners plan more effective, acceptable and sustainable interventions targeted for that specific population. More specifically, even though most African Americans have low FV intake and are sedentary,[7,8] a subset do meet guidelines and thus likely possess qualities such as knowledge, resources, skills, or strategies that allow them to do so.[17] Efforts to identify these qualities can be a positive tool for eliminating health disparities.[18,19] Therefore, rather than focusing on barriers African Americans need to overcome to successfully achieve PA and FV intake guidelines,[20] we can explore of the qualities and characteristics of African Americans who are already successfully meeting both PA and FV intake guidelines.[17] This approach is akin to focusing on community assets rather than simply honing in on community problems and needs when developing health promotion programs.[19,21]

As has been well established, variables from several levels of socioecological model influence PA and dietary behavior in African Americans.[22,23] Individual-level variables may make individuals more or less prone to the uptake of healthy lifestyle behaviors. Financial strain, or an individual's evaluation of the inadequacy of their income, has been previously linked to poor health outcomes,[24] along with inadequate FV intake and insufficient PA in African Americans.[25] African Americans who are lonely, depressed, or stressed rate themselves lower on general health status,[26] which may translate into fewer healthy lifestyle behaviors.[27] There are also some variables with counterintuitive findings in non-African American samples, such as that of worrying about cancer risk, which may be associated with a lower likelihood of performing PA and FV intake, [28] but need more investigation in an African American sample.

In additional to individual characteristics, social and neighborhood-level variables are important for PA and/or FV intake in African Americans. Some social influences, such as social support and social norms, have been consistently associated with greater PA and/or FV intake in African Americans samples.[29–34] Social factors less studied in African Americans, such as social status, social cohesion and social networks, may also encourage these two health behaviors and need additional research.[35–37] On the neighborhood-level,

several variables have been identified as potential deterrents or facilitators for healthy lifestyle behavior in African Americans, such as neighborhood problems and walking infrastructure. However, these variables and others, such as safety, have had persistent mixed associations with both behaviors.[30,31,38–44] While many variables on the individual, social and neighborhood-level have been found to be associated with either PA or FV intake in African Americans, research is needed to identify the most relevant correlates across all levels for successfully performing both behaviors simultaneously.[45]

The purpose of this study is to determine the individual, social and neighborhood-level variables that correlate with successfully performing two cancer- and chronic disease-prevention behaviors simultaneously (i.e., PA and FV intake) in African American adults. Furthermore, among these factors, we will assess which are most critical to the performance of both behaviors.

Methods

Design

This is a cross-sectional analysis using data from Project CHURCH, a cohort of African American adults (≥18 years old) affiliated with Black churches who live in the metropolitan Houston area[46] Briefly, this was a collaborative cohort study that investigated various cancer risk factors, including individual, social and community risk factors related to cancer. Project CHURCH enrolled 1,501 African American participants in 2008–2009.[46] Participants were recruited via various channels available through the church, including flyers, church's website, newsletter, word-of-mouth, video announcements, and onsite health fairs.

Data Collection

Data for this study was collected during follow-up data collection in 2012- four years after initial enrollment. Participants completed written informed consent. Data was collected at the church where a project office had been established. Self-reported data was collected with computer-assisted self-interviewing (CASI), with audio-CASI available for those who needed the additional assistance. Participants received small incentives and a $30 Visa card as compensation for their time.

Measures

Self-reported questionnaires were used to collect various individual, interpersonal/social and neighborhood/built environment correlates.

Individual-level variables.—Perception of risk for cancer was assessed with one item that asked participants how likely they thought it was that they would develop any type of cancer in the future. This measure had a 5-point response scale, from "very low" to "very high". Worry about getting cancer was assessed with one item "How often do you worry about getting some type of cancer?" with response options on a 5-point scale from "never" to "all the time". Perceived stress was assessed with a validated 4-item measure that gauged the frequency of stress-related thoughts and feelings over the previous month.[47] Participants responded how they felt on a 5-point scale from "never" to "very often". Depression was

assessed with the 10-item version of the Center of Epidemiologic Studies Depression Scale, [48] a validated, widely-used tool that asked participants several statements about depressive symptoms on a 4-point scale from “rarely or none of the time (less than 1 day)” to “all the time (5–7 days”. Loneliness was assessed with a 3-item validated scale that asked participants how often (“hardly ever”, “some of the time”, or “often”) they feel: that they lack companionship, left out, and isolated from others.[49] Financial strain was measured with an adapted 7-item scale that asked individuals questions about their experience of financial pressure, with response options of 1=no difficulty to 3=very great difficulty.[50]

Social-level variables.—Perceived social status in the U.S. and in the community were assessed with the MacArthur Scale of Subjective Social Status, which asks individuals to identify where they stand at this time in their life on a 10-step ladder, relative to other people a) in the United States and b) in their community.[51] Social organization involvement was assessed with a single item from the Berkman–Syme Social Networks Index that asked participants to report if they were an active member of various types of groups or clubs, including but not limited to sports leagues, civic or political organizations, professional trade or labor organizations, etc.[52] We summed the number of organizations that participants reported. Social support was assessed with a 12-item scale assessing appraisal, belonging, and tangible support, with response options from 1=definitely true to 4=probably false.[53] Social cohesion was assessed with an adapted 5-item scale, where participants responded on a 5-point Likert scale how much they agreed or disagreed with various statements about people in their neighborhood. [54] Social norms for PA and FV intake were assessed with one-item each that asked participants how many of the people they are close to a) get at least 30 minutes of exercise/PA each day, and b) eat at least 5 servings of FV each day. Participants answered on a 3-point scale from 1=none to 3=most.

Neighborhood-level variables.—Neighborhood problems were assessed with 10 items asking participants how much of a problem they have in their neighborhood with liter in the streets, smells and fumes, walking around after dark, problems with dogs, noise from traffic and other homes, lack of entertainment, traffic and road safety, places to shop, vandalism, and disturbances by neighbors or youngsters.[55] Lastly, participants were asked to identify with 3 separate items how much they agree or disagree (1=strongly disagree to 4=strongly agree) that 1) there are sidewalks on most streets, 2) that there are parks or trails within walking distance from their home and 3) that their neighborhood is a good place to be physically active.

Outcome variable.—PA was assessed using the International Physical Activity Questionnaire-Short Form (IPAQ-SF).[56,57] IPAQ-SF includes 7 questions that gauge frequency and average duration of sitting, walking, moderate activity, and vigorous PA over the previous 7 days. Total metabolic equivalent of task (MET) minutes/week for PA was calculated by multiplying the product of frequency and duration for walking, moderate and vigorous activity by its corresponding MET-value (3.3, 4.0, and 8.0, respectively).[58] Given that this measure often overestimates PA by 700 to 2,000 MET minutes/week,[59] and that median MET-minutes/week in this cohort was 2274 MET minutes/week, we only labeled individuals as “high PA” if they reported vigorous activity on at least 3 days and achieved

≥1500 MET-minutes/week, or if they reported any combination of walking, moderate or vigorous activity on at least 7 days where they achieved ≥3000 MET-minutes/week.[60] All others not achieving these levels were labeled as “low PA”.

FV intake was assessed using the NCI 5 A Day screener.[61] The screener includes 7 questions that assess average past month consumption of 100% fruit juices, green salad, potatoes, and other fruits and vegetables. Using previously established methods,[62] we converted responses on average frequency of consumption over the past month, to total daily servings of FV intake, excluding potatoes. Because this screener is known to underestimate FV intake[62] and the mean and median FV intake for this sample was 3.17 and 2.42, respectively, individuals who consumed ≥3 servings of FV/day were categorized as “high FV intake”, and all others were categorized as “low FV intake”. Using the categories created from these two variables, we created a composite variable for levels of PA and FV intake. All individuals were thus classified into one of 4 groups: high PA/high FV, low PA/high FV, high PA/low FV, and low PA/low FV.

Analysis

We used chi-square and analysis of variance to test for differences in participant characteristics by PA/FV intake group. We examined the association between predictors (individual, interpersonal/social and neighborhood/built environment) and PA/FV intake group using a series of logistic regression models. We used univariate logistic regression analyses to examine the association between each predictor and PA/FV intake group. To select the most important predictors of PA/FV intake group, we used a fully stepwise selection procedure that initially considered all sociodemographic factors and predictors. In stepwise selection, we started with forward selection and re-evaluated all variables at each step to remove eligible variables ($p<0.2$ for entry, $p<0.1$ to stay).[63] Based on these analyses, only sex, education level, and employment were retained as control variables. To interpret significant predictors in the final model, we used $p<0.05$. All analyses were performed in 2019 using SAS v.9.4 (SAS Institute, Cary, NC).

Results

The final analytical sample for this study included 1,009 African American adults who had complete data on the key behavioral variables. Mean age was 49 years and about 78% of the cohort were female (Table 1). Most were employed (72%), were college graduates or higher (66%) and obese (55%). Of the participants, 57% were considered “low PA” and 43% were considered “high PA”, 62% were considered “low FV intake” and 38% were considered “high FV intake”. The composite variable for PA and FV intake thus resulted in 18% of the sample being labeled as high PA/high FV intake, 20% as low PA/ high FV intake, 24% as high PA/low FV intake, and almost 38% classified as low PA/low FV intake. Sex and educational level were significantly different between groups. Of the women, the low PA/low FV intake group was the largest, while for men, the high PA/low FV intake group was the largest.

The results between both unadjusted and adjusted bivariate analyses were similar, so we only present estimates adjusted for sex, educational level and employment status (Table 2).

In terms of *individual-level factors*, as compared to those with low PA/low FV intake, those with high PA/high FV intake had statistically significant lower odds of worrying about getting cancer, perceived stress, loneliness, and financial strain. For *social-level factors*, as compared to those who had low PA/low FV intake, those in the high PA/high FV intake group perceived themselves to have higher social status both in their community and the U.S. as a whole. Those in the high PA/high FV intake group significantly reported more social cohesion, were members of more social networks/organizations, and reported having more individuals around them meeting PA and FV intake guidelines, as compared to those who had low PA and low FV intake; results were statistically significant. No neighborhood-level variables were associated with high PA/high FV intake or any of the other outcome categories.

In stepwise multinomial logistic regression models where all variables were initially included, only variables on the social-level were significantly associated with having high PA/high FV intake (Table 3 shows factors that were significant in the models). More specifically, perceiving oneself to have higher social status in the community, participating in more social organizations, stronger social norms for FV intake, and stronger social norms for PA were associated with higher odds of high PA/high FV intake compared to low PA/low FV intake.

Discussion

These findings indicate that social influences may be most critical for African American adults to successfully perform high levels of both PA and FV intake behaviors. When fitting the regression models for the most relevant predictors of both PA and FV intake, we found that an individual's perceived social status in their community, the depth of their involvement in social organizations, and the strength of their social norms for FV intake and PA were significantly associated with being in the group that had both high PA and high FV intake. Our results identify the importance of social norms for successfully achieving both FV intake and PA behaviors, which is consistent with the limited literature examining this construct in African Americans.[32,64] Individuals who see others around them performing PA and/or healthy dietary behaviors, if asked explicitly, may not be able to report that these norms strongly influence their behavior, but the research in this area indicates that individuals are often not consciously aware that norms impact their own behavior.[65,66]

Interestingly, both social status and involvement in social organizations are upstream factors that are not directly related to the performance of these behaviors. One caveat is that individuals who are more involved in local social organizations and perceive themselves to have relatively high social status in their community may be of high socioeconomic status, a variable known to be positively associated with both PA and FV intake.[67] However, our analyses controlled for both employment status and education level, two markers of socioeconomic status. Other explanations for these findings may be that those who are involved in more social organizations are more exposed to opportunities or spaces to do PA, [68] or those who perceive themselves to be of higher social status in the community may attribute this status to their being more active and fit compared to others (reverse causation).

Future studies are needed to parse out the importance of the various social factors in relation to health behaviors in African Americans.

We also found that neighborhood-level factors were not associated with the performance of both behaviors. This is not surprising, as a limitation of our study was a lack of neighborhood-level factors directly related to access to or consumption of fruits and vegetables. Regardless, neighborhood-level factors were also not associated with levels of PA, even when FV intake was held constant (i.e. high PA/low FV intake, low PA/low FV intake). This finding adds to the mixed literature in this area, whereby neighborhood-level factors are sometimes found to be important for PA in African Americans,[30,31,40] though not consistently.[39,41,42]

Our study has several limitations. This study was limited to cross-sectional analyses, which preclude the assessment of longitudinal relationships and presence of causality between these variables. We identified the subsection of this African American cohort that was most successful at completing high levels of PA and eating more FV by assessing both mean and medians in our cohort for the two behavioral variables and anticipating the issues of over-reporting of PA[59] and under-reporting of FV intake[62] using our chosen measures. However, it is still likely that some individuals were misclassified. A few of our constructs were measured with single item variables, which prevents the assessment of reliability and typically does not fully address the complexity of the concept. The neighborhood-level variables were all associated with the built environment, and none measured neighborhood-level variables more directly associated with the food environment. Lastly, the data presented here are from 2012, though we believe that the data on determinants and behaviors are still relevant to today's population.

Thus far, many interventions to improve nutrition and PA in African American populations have been effective in achieving behavior change, but limited evidence exists that changes are sustained over time.[69] Furthermore, despite the effectiveness of some interventions, there is still a clear need for more interventions that target these two chronic disease and cancer prevention behaviors in African Americans, including in faith-based settings.[70] Interventions in faith-based settings that promote church members' general engagement in social organizations, change social norms for PA and FV intake to encourage health behaviors, and elevate church members' perceived status in the community may be key to achieving and sustaining high PA and high FV intake in African Americans.

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So What? (Implications for Health Promotion Practitioners and Researchers)

What is already known on this topic?

Many variables from the individual, social and neighborhood-level have been identified as important correlated of either FV intake or PA in African Americans.

What does this article add?

This article fills a gap in the literature, identifying some of the most relevant correlates for achieving both high levels of PA and FV intake simultaneously in an African American faith-based sample.

What are the implications for health promotion practice or research?

Interventions in faith-based settings that focus on the social environment, specifically by promoting church members' general engagement in social organizations, changing social norms for PA and FV intake to encourage these health behaviors, and elevating church members' perceived status in the community may be key to achieving and sustaining both high PA and high FV intake in African Americans.

Table 1:

Participant characteristics (n=1009)

Variable *n, %*	**Full sample**	**High PA/high FV intake N=182**	**Low PA/high FV intake N=205**	**High PA/low FV intake N=244**	**Low PA/low FV intake N=378**	**Difference between groups**
Age, **Mean (SD)**		49.6 (12.8)	49.3 (12.6)	50.45 (12.7)	48.0 (11.7)	0.09
Sex						<0.001
Male	223 (22.1%)	51 (28.0)	28 (13.7)	83 (34.0)	61 (16.1)	
Female	786 (77.9%)	131 (72.0)	177 (86.3)	161 (66.0)	317 (83.9)	
Education level						<0.001
HS grad/Some college	339 (33.6%)	59 (32.4)	50 (24.4)	102 (41.8)	128 (33.9)	
College graduate	434 (43.0%)	73 (40.1)	90 (43.9)	108 (44.3)	163 (43.1)	
Post-graduate	236 (23.4%)	50 (27.5)	65 (31.7)	34 (13.9)	87 (23.0)	
Annual household income						0.12
Less than $40,000	256 (25.7%)	47 (26.3)	48 (23.4)	66 (27.6)	95 (25.4)	
$40,000 - $79,999	395 (39.6%)	57 (31.8)	79 (38.5)	101 (42.3)	158 (42.3)	
$80,000 or more	346 (34.7%)	75 (41.9)	78 (38.1)	72 (30.1)	121 (32.3)	
Marital status						0.66
Married/living partner	441 (43.8%)	85 (46.7)	83 (40.5)	109 (44.7)	164 (43.6)	
Not married	566 (56.1%)	97 (53.3)	122 (59.5)	135 (55.3)	212 (56.4)	
Employment status						0.27
Yes	727 (72.0%)	128 (70.3)	139 (67.8)	176 (72.1)	284 (75.1)	
No	282 (28.0%)	54 (29.7)	66 (32.2)	68 (27.9)	94 (24.9)	
BMI						0.49
Underweight/Normal	147 (12.2%)	30 (17.3)	32 (15.9)	40 (17.0)	45 (12.5)	
Overweight	290 (30.0%)	57 (33.0)	55 (27.4)	71 (30.2)	107 (29.8)	
Obese	531 (54.8%)	86 (49.7)	114 (56.7)	124 (52.8)	207 (57.7)	

Note: PA, physical activity; FV, fruit and vegetable; SD, standard deviation; HS, high school; BMI, body mass index.

Table 2:

Adjusted Bivariate Associations of Individual, Social and Neighborhood Variables with Categories of Simultaneous Physical Activity and Fruit and Vegetable Intake Behavior

Reference group: **Low PA/low FV intake Odds Ratio (95% CI)**	**High PA/high FV intake**	**Low PA/high FV intake**	**High PA/low FV intake**
Individual			
Perception of risk for cancer	0.88 (0.73, 1.06)	0.85 (0.71, 1.01)	0.85 (0.72, 1.01)
Worry about getting cancer	0.79 (0.65, 0.98) *	0.93 (0.76, 1.12)	0.88 (0.73, 1.05)
Perceived stress	0.93 (0.87, 0.98) *	0.96 (0.91, 1.01)	0.95 (0.90, 1.01)
Depression	0.68 (0.41, 1.14)	0.83 (0.52, 1.32)	0.78 (0.49, 1.22)
Loneliness	0.85 (0.75, 0.96) *	0.96 (0.86, 1.07)	0.90 (0.81, 1.00)
Financial Strain	0.94 (0.90, 0.99) *	0.95 (0.91, 0.99) *	0.96, 0.92, 1.00)
Social			
Social status-community	1.18 (1.06, 1.31) **	1.17 (1.06, 1.30) **	1.14 (1.04, 1.26) **
Social status-U.S.	1.15 (1.04, 1.28) **	1.16 (1.05, 1.29) **	1.08 (0.98, 1.19)
Social networks	1.66 (1.31, 2.11) ***	1.32 (1.04, 1.67) *	1.01 (0.88, 1.40)
Social support	1.03 (0.99, 1.06)	1.02 (0.99, 1.05)	1.01 (0.99, 1.04)
Social cohesion	1.09 (1.03, 1.15) **	1.06 (1.01, 1.12) *	1.05 (1.00, 1.11) *
Social norms for FV intake	2.54 (1.68, 3.84) ***	1.67 (1.15, 2.42) **	1.64 (1.15, 2.34) **
Social norms for PA	3.54 (1.91, 6.59) ***	1.36 (0.87, 2.12)	1.60 (1.02, 2.51) *
Neighborhood			
Neighborhood problems	0.97 (0.92, 1.03)	0.98 (0.83, 1.03)	1.02 (0.97, 1.07)
Presence of sidewalks	1.01 (0.69, 1.46)	1.05 (0.73, 1.51)	1.00 (0.71, 1.41)
Presence of parks/trails	1.02 (0.69, 1.50)	1.05 (0.72, 1.53)	1.14 (0.78, 1.63)
Neighborhood good for PA	1.16 (0.78, 1.73)	1.28 (0.87, 1.89)	1.19 (0.83, 1.72)

Note: Models controlled for sex, education, and employment status. PA, physical activity; FV, fruit and vegetable; CI, confidence interval.

* p<.05

** p<.01

*** p<.001

Table 3:

Stepwise Multinomial Logistic Regression Identifying Correlates of Simultaneous Physical Activity and Fruit and Vegetable Intake

Reference group: **Low PA/low FV intake Odds Ratio (95% CI)**	**High PA/high FV intake**	**Low PA/high FV intake**	**High PA/low FV intake**
Social status-community	1.14 (1.01, 1.29) *	1.17 (1.05, 1.31) **	1.10 (0.99, 1.22)
Social networks	1.60 (1.24, 2.06) ***	1.28 (0.99, 1.64)	1.07 (0.84, 1.37)
Social norms for FV intake	2.03 (1.26, 3.29) **	1.53 (0.98, 2.37)	1.55 (1.02, 2.35) *
Social norms for PA	2.80 (1.33, 5.89) **	1.18 (0.68, 2.03)	1.18 (0.70, 1.99)

Note: All variables were assessed but removed from the model using stepwise selection procedure. The final stepwise model controlled for sex, education, and employment status. PA, physical activity; FV, fruit and vegetable; CI, confidence interval.

* p<.05

** p<.01

*** p<.001