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An Exploration of Multi-Level Physical Activity Correlates among Low-Income African Americans in Alabama and Mississippi

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Abstract

Understanding obesity-related health disparities among low-income, African Americans in the south requires further research investigating the range of factors influencing health behaviors. This study sought to examine the relationship between meeting the minimum recommendation for moderate physical activity and multi-level, including policy, systems, and environmental (PSE) strategies thought to influence health behaviors. We utilize pre-intervention, community survey data from a sample of 256 low-income, predominantly African Americans in three southeastern cities. Results indicate that individual, social, and environmental factors are related to whether participants met the recommended guidelines for physical activity and that sex predicts whether guidelines are met.

Keywords

health disparities; obesity; multi-level interventions; minority health; physical activity

INTRODUCTION

Approximately 36% of adults in the United States are considered obese¹ and significant differences in obesity prevalence exists between racial/ethnic groups and geographic regions. For example (See Table 1), Alabama and Mississippi have two of the highest obesity rates among states in the U.S.^{2–3} and significant disparities exist between Non-Hispanic Whites and Blacks. The higher prevalence of obesity, especially among minority populations, and associated chronic diseases, such as type 2 diabetes, certain types of cancers, heart disease and stroke⁴ establishes the need for interventions aimed at preventing and/or reducing obesity such as those focused on increasing physical activity levels.

Low levels of physical activity is a major risk factor for obesity⁴ and the focus of many obesity prevention and treatment interventions. Recent efforts to promote physical activity

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Conflicts of Interest

The authors declare no conflicts of interest.

have included multi-level interventions focused on policy, systems, and environmental (PSE) strategies^{5–8}. PSE strategies target population level impact by promoting change within environmental contexts and making healthier options the premier choice⁸. These strategies, such as increasing access to physical activity opportunities by improving neighborhood walkability and work site wellness policies and programs, show promise in supporting individual lifestyle change and related health outcomes⁹. Such interventions are especially critical for addressing disparities among health vulnerable populations, such as low-income, racial/ethnic minority populations¹⁰ because of systemic barriers like limited access to physical activity opportunities that are often faced by health vulnerable populations. Thus, a multi-level approach is ideal for increasing physical activity levels among low-income African Americans, a population found to have low levels of physical activity¹¹ and the priority population for the current intervention.

In the United States, less than half of the population meets the recommended guidelines of 150 minutes of moderate-intensity physical activity per week and African Americans have lower levels of physical activity when compared to whites^{11–13}. Individual, social, and environmental factors are associated with physical activity levels¹⁴. Individual factors such as health status and intention to exercise, social factors such as social support and community engagement, and environmental and policy factors such as access to recreation facilities have all been found to be correlates of physical activity or health outcomes^{15–16}.

The social-ecological framework (Figure 1), which highlights the relationship between individuals, the environment, and how factors within each system may influence health behaviors and health outcomes, provides the theoretical foundation for the use of multi-level interventions that include PSE strategies. The evidence base for many of these interventions is still being developed^{17–19,6}, resulting in a gap in the knowledge base surrounding which factors are related to pre-intervention levels of physical activity. To address health disparities associated with low levels of physical activity, we must understand the range of factors, including individual, community, social, and environmental correlates that influence physical activity.

We present an exploratory examination of the association between multi-level factors and physical activity recommendations among a sample of low-income, predominantly African Americans in Alabama and Mississippi. We expand the research in this area by investigating multi-level correlates within the same model^{20–22} and sharing findings regarding multi-level factors that might be relevant to researchers working with similar populations. Furthermore, with the limited research on pre-intervention relationships among multi-level correlates, our findings provide insight for tailoring interventions for the population under study. We sought to answer the question: which multi-level factors are associated with physical activity levels among African Americans in low-resource communities in Alabama and Mississippi?

METHODS

Current Study

The data are from a multi-level obesity prevention study funded by the Gulf States Health Policy Center (GSHPC), which is a comprehensive community, education, and research

center with a mission of improving health outcomes in Alabama, Mississippi, Louisiana, Florida, and Texas. The project seeks to reduce chronic-disease disparities by utilizing PSE strategies to increase physical activity levels among low-income, African Americans.

Procedures

The overall study includes two levels of assessments, a measurement of (1) population impact and (2) individual impact. The current study measures population impact. We determined that 6 census tracts (2 per county) was the required sample size needed to examine impact at the population level and a target of 488 participants (244 pre- and 244 post intervention) was the minimum number of participants. The second level of assessment is the individual impact. The target number of participants for this assessment was 440 individuals.

Participants for each level of assessment were recruited with the guidance and assistance of local coalitions established through the Gulf States Health Policy Center in each of the 3 counties under study that encompassed the targeted census tracts—the Bayou La Batre Area Coalition, the Birmingham Area Coalition, and the Hattiesburg Area Health Coalition. The coalitions included faith-based organizations, city officials, civic leaders, health department representatives and school officials. Regular meetings were held in each census tract with key individuals from these groups. Key leaders from these groups identified locations to conduct the survey, recruited individuals based on the study protocol and assisted with logistics during the on-site surveys. Screening questions asked participants if they were 19 years of age or older and whether they lived in the priority census tracts (targeted neighborhoods).

The University of Alabama at Birmingham (UAB) Recruitment and Retention Shared Facility (RRSF) led data collection efforts. The team traveled to the designated census tracts and conducted all interviews face-to-face between May and August of 2015. An equal percentage of male and female participants who were 19 years of age or older were recruited. Participants were consented and data were collected from individuals residing in a total of six census tracts, two in each county. Participants received a \$15 gift card for completing the interview. Census tracts were selected based on their large proportion of African-American (55%) low-income (28% below the poverty line) residents, accessibility to the population, and the feasibility of conducting the survey and intervention in that area. This study was approved by the Institutional Review Board for Human Use at The University of Alabama at Birmingham (UAB).

Measures

Outcome—The outcome variable “met physical activity guidelines” was defined as being physically active for at least 150 minutes each week. Self-reported physical activity levels were collected using a modified version of the BRFSS.²³ The physical activity score was calculated based on the CDC BRFSS codebook.

Individual/Personal Factors—Individual/Personal measures include self-reported fruit and vegetable consumption, which was collected using a modified version of the BRFSS²³.

Fruit included, fruit juice and whole fruit; vegetables included beans, dark green vegetables, orange-colored vegetables and other vegetables. We also collected demographic information, such as race/ethnicity, sex, income, and education.

Social Environment/Networks—Social environment/networks were measured by two questions asking participants if they or a family member had engaged in policy related activities or attended a meeting where health policy was discussed. The variable *policy engagement* included contacted an elected official, signed a petition, initiated a discussion in a city, neighborhood, church, or school, and other activities. The variable *policy meetings* included attending city meetings, neighborhood association meetings, church meetings, public school meetings and other types of meetings. For the analyses, response options were collapsed into two categories-participated or did not participate.

Physical Environment/Settings—Participants were asked to report on aspects of their physical environment such as whether children walk to school or attend child care centers with healthy policies (“Do your children attend a school or daycare where healthy eating and physical activity is promoted?”) and whether they attend health conscious churches (“Do you attend a church or other faith-based organization where healthy eating is promoted?”). Response options were yes or no.

Macro-level Environments/Sectors—Participants were asked whether physical activity/exercise and healthy nutrition had been promoted in their communities over the last year (“In the past 12 months has physical activity been promoted in your community through media outlets such as print, TV, billboards, radio ads, bus wraps?”). Response options were yes or no. Participants were also asked whether they participated in any food assistance programs and asked to identify the programs, if any, of which they were a participant. The variable *receives assistance* included food stamps, school breakfast and/or lunch program, Special Milk program, WIC, summer food service, Commodity Supplemental Food program, Community Food and Nutrition Program, TANF, SSI, assistance from family members, disability, unemployment and other.

Statistical Analyses

The first step in our analyses was to generate descriptive data. We calculated the mean, standard deviation, median and range, which are presented for continuous variables, and percentages and counts are presented for categorical variables. For the univariate analysis, the two-group Wilcoxon and Chi-square tests were used to exam the association between continuous variables and categorical variables. We then carried out multivariate logistic regression analysis with the PROC GENMOD procedure in SAS to assess the association between whether participants met the recommendation for physical activity with the unstructured covariance accounting for variability between clusters (census tracts). Factors that had significant ($p < 0.1$) association with the outcome variable in the univariate analysis were included in the multivariate logistic regression analysis. Binomial distribution was used as the link function. The stepwise selection method with type I error at 5% was applied to select the most predictive variable(s). Missing values were imputed as the method of West²⁴.

RESULTS

Sample Characteristics

As shown in Table 2, our sample (N=256) is 47.3% female with a mean age of 51.7 years. The sample is predominantly African American (93.4%) with 16.4% reporting less than a high school diploma, 43.8% reporting high school diploma or GED, and 34.8% reporting some college or higher. Most of our participants, 130, were from Jefferson County, Alabama, 64 from Mobile County, Alabama and 62 from Forrest County, Mississippi.

Self-reported physical activity participation is reported in Table 3. Among the entire sample, 77% of participants reported engaging in some form of physical activity with only slight variation among counties. Further analysis was done on the entire sample instead of individual counties because of the similarities between counties.

Bivariate Relationships

Univariate analysis (Table 4) revealed significant associations between whether physical activity guidelines were met and sex ($p = .001$), fruit and vegetable consumption ($p = .01$), attending (self or family) a health policy-related meeting ($p = .01$), and attending churches with healthy policies ($p = .01$). Individuals who consumed more fruits and vegetables, those who (or their family members) attended health policy related meetings, and those who attended churches with healthy policies were more likely to have met the recommended guidelines for physical activity. We found that additional factors such as walk to school practices and physical activity promotion campaigns were trending towards significance ($p < .10$) with those who reported children walking to school in their neighborhood and billboards or other media promoting physical activity being more likely to meet the minimum recommendations for physical activity.

Multivariate analyses demonstrate (Table 5) that sex was the only significant predictor ($p = .01$) of whether participants met the recommended guidelines for physical activity with males having a lower odds of meeting the guidelines than females (OR=2.46, 95% CI 1.47–4.116, $p = 0.0006$) in these communities.

DISCUSSION

This study examined the impact of multi-level factors ranging from individual to PSE strategies on physical activity levels among a sample of low-income African Americans in the southeast prior to a PSE focused intervention with a goal of increasing physical activity levels. Other studies examining correlates of physical activity among members of the priority populations have found support for individual, social, and environmental correlates^{20–22}. We examine additional correlates, included in a single model, and found significant support for three levels, including environmental which has had mixed support in other studies. Significant correlations were found between whether participants met physical activity guidelines and individual, social, physical and macro-environmental factors.

Sex was associated with whether participants met physical activity guidelines and was the only significant predictor when multivariate analysis was used. We found that African

American men have lower odds of meeting the recommended physical activity guidelines, which is consistent with some of the literature showing that women are more likely to engage in non-work physical activity than men¹¹. More research is needed to understand and address these differences. This does suggest, however, that efforts to engage African American men in obesity-related interventions should be increased as non-work physical activity is associated with better health outcomes. We did not find significant associations between whether participants met the recommended guidelines for physical activity and race/ethnicity, age, income, education, or marital status. However, that may be due to the homogeneity of the sample. We did find a significant association between fruit and vegetable consumption and physical activity. This provides evidence of the link between health behaviors such as healthy eating and physical activity and suggests that interventions focused on both⁵ may have significant impacts on obesity-related outcomes.

Social factors were also found to be correlated with whether participants in the sample met the recommendation for 150 minutes of moderate physical activity. We found that participants' or their family members' attendance at a meeting where health policy was discussed was related to whether physical activity guidelines were met. This may provide support for the importance of social networks in influencing health behavior and suggests that interventions should include family and/or peers as part of the intervention when feasible. This may also allude to the importance of civic engagement or involvement in policy issues, however such relationships need further examination.

We also found significant associations between attending churches with healthy policies, which provides evidence of the impact of environmental support. Thus, multi-level interventions that focus on engaging families and churches might show improvements among the priority population. This finding provides support for similar studies that focus on engaging churches to promote healthy lifestyle changes among participants. Finally, we found that physical and macro-environmental factors such as school transportation practices and physical activity campaigns have some association with whether physical activity guidelines are met. This suggests that focusing on PSE level factors will also have positive impacts on physical activity outcomes among intervention participants.

It should be noted that since our sample was drawn from low income African-Americans in the southeast, these results might be localized in nature. The correlation between low income African-Americans' engagement in policy issues and health practices, in this case meeting physical activity guidelines, may be influenced by cultural factors within the social environment. For example, the role of the church is significant within Southern African American communities and this may intensify the association between attending churches with healthy policies and physical activity practices.

Limitations

As with most studies, the current study has a few limitations. Due to how some of the survey questions were worded, we were unable to narrow down the most significant factors. For example, we were unable to determine whether individual participation in meetings or involvement in health policy or family/peer involvement predicts whether participants met the recommended guidelines because the question asks about both the participant and/or a

family member in the same question. Moreover, as is the case with cross-sectional analyses, we cannot determine whether attending health policy meetings increases physical activity or people who are more physically active are more likely to participate in healthy policy meetings. Further, our results are not generalizable to the larger population due to the homogeneity of the sample and the fact that census tracts were not randomly chosen. Therefore, we cannot evaluate PSE factors as causal mechanisms. Still, despite the noted limitations the current study provides data to support the development of a targeted obesity-prevention intervention among the priority population.

Conclusions

Our findings suggest that it might be possible to describe the environments of those who meet the minimum recommended guidelines for physical activity versus those who do not. For example, individuals who consumed more fruits and vegetables, attended health policy related meetings (either themselves or family members), and who attended churches with healthy policies were more likely to have met the recommended guidelines for physical activity. Thus, additional research examining the relationship between health policy engagement and physical activity levels would contribute to our understanding of the role of policy engagement in physical activity outcomes. Further, the findings from this study suggest that it is important to examine pre-intervention associations with proposed intervention outcomes. Understanding these relationships prior to the intervention provides an opportunity to tailor interventions to result in sustainable, high-impact positive health outcomes. In the case of interventions focused on physical activity, the ability to develop targeted interventions which focus on factors found to have some impact on participant behavior have the potential to promote increased physical activity levels among the priority population. It is especially important for researchers and community-based organizations who implement multi-level interventions to identify areas of focus as they may have limited resources with which to have the greatest impact. Findings such as those presented here can provide guidance for where to focus such efforts and how to best promote healthy lifestyle changes when working with health vulnerable populations.

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FIGURE 1.

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Obesity rates by race/ethnicity among adults 20 years and over in the U.S., Alabama, and Mississippi

Table 1.

Obesity Rates (%)	Total	Non-Hispanic Whites	Non-Hispanic Blacks
U.S.	37.9	36.4	48.4
Alabama	35.7	32.4	44.1
Mississippi	37.3	31.9	44.6

Source: The State of Obesity, 2016

Table 2.

Sample Demographics

Socio-cultural Demographics	JEFFERSON N=130 N (%)	MOBILE N=64 N (%)	FORREST N=62 N (%)	Total N=256 N (%)
Sex				
Female	60 (46.2)	31 (48.4)	30 (48.4)	121 (47.3)
Male	59 (45.4)	31 (48.4)	32 (51.6)	122 (47.7)
Age (years)				
mean (std)	52.0(15.1)	45.7 (17.2)	53.4 (18.9)	51.7 (15.5)
median	53.5	50.9	58.7	54.6
Race				
White	2 (1.54)	0 (0)	0 (0)	2 (0.8)
Black or African- American	116 (89.2)	61 (95.3)	62 (100)	239 (93.4)
Other	2 (1.5)	1 (1.6)	0 (0)	3 (1.2)
Unknown	10 (7.7)	2 (3.1)	0 (0)	12 (4.7)
Ethnicity				
Hispanic	1 (0.8)	0 (0)	0 (0)	1 (0.4)
Non-Hispanic	119 (91.5)	62 (96.9)	62 (100)	243 (94.9)
Education (highest level completed)				
Less than high school	21 (16.2)	13 (20.3)	8 (12.9)	42 (16.4)
High school grad or GED	50 (38.5)	35 (54.7)	27 (43.6)	112 (43.8)
Some college or higher	48 (36.9)	14 (21.9)	27 (43.6)	89 (34.8)
Missing	11 (8.5)	2(3.1)	0 (0)	13 (5.1)
Unknown	10 (7.7)	2 (3.1)	0 (0)	12 (4.7)

Table 3.

Percentage of sample who report engaging in physical activity by county

Physical activity participation N (%)	JEFFERSON N=130	MOBILE N=64	FORREST N=62	Total N=256
Yes	100 (76.9)	52 (82.8)	44 (71.0)	197 (77.0)
No	20 (15.4)	9 (14.1)	18 (29.0)	47 (18.4)
Unknown	10 (7.7)	2 (3.1)	0 (0)	12 (4.7)

Table 4.

Bivariate analysis examining relationships between, met physical activity guidelines' and multi-level intervention strategies

PHYSICAL ACTIVITY INDEX MET OR NOT MET PAG		Did not meet Physical Activity Guideline (N=134)	Met Physical Activity Guideline (N=122)	P-Value
Age	Mean ± SD	52.4 ± 15.7	50.4 ± 14.9	0.2772
	Median	55	53	
	Min-Max	19.8 – 84.1	19.7 – 80.3	
Gender	N	114	122	
	Male	75 (56.0)	48 (39.3)	0.0005
	Female	47 (35.1)	74 (60.7)	
Race	White	1 (0.7)	1 (0.8)	0.2190
	Black or African- American	121 (90.3)	118 (96.7)	
	Other (specify)	0 (0.0)	3 (2.5)	
Ethnicity	Hispanic	0 (0.0)	1 (0.8)	0.3163
	Non-Hispanic	122 (91.0)	121 (99.2)	
	Less than \$20,000	14 (10.4)	19 (15.6)	0.6891
Income	20,000 or higher	11 (8.2)	12 (9.8)	
	Less than high school	21 (15.7)	21 (17.2)	0.8107
	High School Graduate or GED	58 (43.3)	54 (44.3)	
Marital	Some College and higher	42 (31.3)	47 (38.5)	
	Single	56 (41.8)	65 (53.3)	0.2329
	Married	23 (17.2)	26 (21.3)	
	Divorced/Separated	22 (16.4)	16 (13.1)	
	Widowed	13 (9.7)	5 (4.1)	
	Living together but not married	8 (6.0)	10 (8.2)	
Fruit and vegetable consumption	Mean ± SD	3.3 ± 3.2	3.9 ± 3.1	0.0104
	Median	2	3	
	Min-Max	0 – 17.1	0.2 – 21.1	
	N	134	122	
	Yes	75 (56.0)	122 (100)	

PHYSICAL ACTIVITY INDEX MET OR NOT MET PAG		Did not meet Physical Activity Guideline (N=134)	Met Physical Activity Guideline (N=122)	P-Value
Health policy involvement	No	111 (82.8)	95 (77.9)	0.3167
	Yes	23 (17.2)	27 (22.1)	
Attended a policy meeting	No	84 (62.7)	58 (47.5)	0.0149
	Yes	50 (37.3)	64 (52.5)	
Walk to school practices	No	54 (40.3)	36 (29.5)	0.0709
	Yes	80 (59.7)	86 (70.5)	
Attended churches with healthy policies	No	73 (54.5)	43 (35.2)	0.0020
	Yes	61 (45.5)	79 (64.8)	
Child attends school/daycare with healthy policies	No	87 (64.9)	75 (61.5)	0.5674
	Yes	47 (35.1)	47 (38.5)	
Nutrition promotion campaigns observed in media	No	70 (52.2)	54 (44.3)	0.2021
	Yes	64 (47.8)	68 (55.7)	
Physical activity promotion campaigns observed in media	No	82 (61.2)	61 (50.0)	0.0716
	Yes	52 (38.8)	61 (50.0)	
Received Food Assistance	No	36 (26.9)	29 (23.8)	0.5698
	Yes	98 (73.1)	93 (76.2)	

Logistic Regression to predict whether physical activity was met for participants in all counties combined

Table 5.

Predictors	Odds Ratio	95% CI	P-value
Sex (Female vs Male)	2.46	(1.47, 4.116)	0.0006
Fruit and vegetable consumption	0.99	(0.898, 1.086)	0.7963
Family members attended a policy meeting (Yes vs No)	1.42	(0.742, 2.697)	0.2914
Walk to school practices (Yes vs No)	0.92	(0.466, 1.806)	0.8020
Churches with healthy policies (Yes vs No)	1.18	(0.631, 2.206)	0.6068
Physical activity promotion campaigns (Yes vs No)	1.00	(0.533, 1.882)	0.9967