Correlates of Physical Activity Levels in a Sample of Urban African Americans with Type 2 Diabetes

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Background: Although regular physical activity is recommended for all adults and is vital in the management of diabetes, activity levels among African Americans with diabetes continue to be sub-optimal. The factors influencing physical activity in this group have not been well examined.

Research Design and Methods: Physical activity levels were assessed in 186 African Americans with type 2 diabetes in an urban inner-city community in 4 daily domains; leisure-time physical activity, episodic vigorous activity, blocks walked, and stairs climbed. Linear and logistic regression techniques were used to identify factors independently associated with physical activity levels.

Results: A minority of both men (40%) and women (29%) reported engaging in regular physical activity for the purpose of exercise. Women walked significantly fewer blocks/week compared to men (17 vs 41, $P<.05$). Independent predictors of low physical activity were obesity, lower household income, and the self-perception of being more active than one's counterparts. A predictor of higher physical activity was the perception of needing to get enough exercise to keep healthy. There was no association between physical activity level and other characteristics, including the perception of oneself as overweight or trying to lose weight.

Conclusions: These data suggest that, among our sample of African Americans with diabetes, many do not engage in regular activity, women walk significantly less than men, and weight loss efforts may not commonly include physical activity. Obesity, lower income level, and confidence about activity levels may identify individuals with lower physical activity levels. These data should be useful for developing targeted and culturally appropriate interventions to promote physical activity in this high-risk community. (*Ethn Dis*. 2004;14:198–205.)

Key Words: African Americans, Blacks, Determinants, Physical Activity, Type 2 Diabetes

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Introduction

Diabetes mellitus is a large and growing public health problem in the United States, affecting 16 million Americans.[1] African Americans are especially affected, with a disproportionately higher incidence, as well as increased morbidity and mortality from its complications, compared to other populations.[2,3] An increasing amount of scientific evidence has shown important physiologic benefits of physical activity, including improved weight control, insulin sensitivity, and glycemic control.[4] Growing evidence also demonstrates that low levels of physical activity and increasing obesity are contributing to the rising incidence of type 2 diabetes, risk for cardiovascular disease,[5] and mortality.[6] Accordingly, current standards of care promote regular physical activity as an integral component in the prevention and management of type 2 diabetes,[7–10] and regular physical activity is now widely endorsed and recommended for all US adults.[11]

Unfortunately, despite the evidence supporting the importance of physical activity for improved health and longevity, physical activity levels among American adults continue to be sub-optimal in nationally representative surveys,[12,13] particularly among African Americans,[14–17] and patients with diabetes.[18] However, most of the studies on physical activity in American populations have provided primarily descriptive information on the prevalence and patterns of certain types of physical activity. Less is known about the individual factors that influence physical activity levels, with few studies focusing on African Americans, and even fewer focusing on African Americans with diabetes. Given the urgent need to reduce the excess burden of diabetes and complications among African Americans, more insight is needed into these factors in order to make more specific, targeted, and relevant recommendations in efforts to promote physical activity. We, therefore, conducted a cross-sectional study in a sample of African Americans with type 2 diabetes from an urban community, to characterize physical activity patterns in a range of activity domains, and to identify personal characteristics, as well as demographic, clinical, psychosocial, and environmental factors, that influence physical activity levels.

Research Design and Methods

Study Setting and Participants

African-American adults aged 35–75 years with type 2 diabetes, who resided in East Baltimore, an urban inner-city community, and attended either of 2 primary care clinics affiliated with Johns Hopkins Hospital, were eligible to participate in *Project Sugar 1*. Details of the project design and recruitment have been previously described.[19] The project was a randomized, controlled trial of behavioral interventions aimed at improving metabolic control. Recruitment was facilitated by faith-based community groups that indicated support for the inception and goals of the study. Individuals with evidence of end-stage complications from diabetes, such as blindness, extremity amputations, end-stage renal disease requiring dialysis or renal transplant, or co-morbid conditions limiting probable life span to less than 4 years, such as cancer or AIDS, were excluded. Of the 3,800 medical charts reviewed

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for initial eligibility criteria, 822 were identified as having type 2 diabetes, and 332 were scheduled for the initial screening visit for informed consent. Baseline data from the 186 individuals who attended both of the required initial screening visits for randomization into the study were used for this cross-sectional analysis.

Data Collection

All data were obtained from structured interviews, physical assessments, and medical records review. Participants completed extensive questionnaires about their exercise and activity levels, demographic background, environment, health, physical symptoms perceived to limit activity, as well as perceptions of their current and desired body weight using drawings depicting a range of body habitudes.[20] The physical assessment included measurements of height without shoes using a stadiometer, and weight with subject wearing light clothing on a balance beam scale, which were then used to calculate Body Mass Index (BMI) in kg/m^2. Blood samples were taken for laboratory measurements of glycosylated hemoglobin (HbA_{1c}) using high pressure liquid chromatography, and for a fasting lipid profile that included total cholesterol (TC), high-density lipoprotein cholesterol (HDL), triglycerides (TG), and calculated low-density lipoprotein cholesterol levels (LDL) in mg/dL using automated enzymatic spectrophotometry. Medical records review was performed by trained data collectors using data abstraction forms to document clinical diagnoses, such as hypertension, cardiovascular disease, and arthritis, as listed by subjects' primary care physicians in their medical history and/or active problem list within the previous 12 months. A Charlson Comorbidity Index[21] was determined for each participant, ranging on a scale from a minimum of 1 to a maximum of ≥ 4, with higher scores indicating a higher level of co-morbidity.

Physical Activity Assessment

Physical activity was assessed in 4 domains. Standard assessments included leisure time physical activity (LTPA) assessed using a short questionnaire for the measurement of habitual physical activity during leisure time developed by Baecke et al.[22] A leisure-time physical activity index score was derived for each participant, with scores ranging on a scale from a minimum of 1 to a maximum of 4, with higher scores indicating increased physical activity. The question: "At least once a week, do you engage in regular activity, such as brisk walking, jogging, bicycling, or swimming, long enough to work up a sweat, get your heart thumping, or get out of breath?" was used as an indicator of more vigorous or strenuous physical activity, based on work conducted by Paffenbarger showing differences in benefits derived by intensity of physical activity.[23,24] In light of prior research indicating inadequacy of standard physical assessments in US minority populations,[25,26] we added 2 additional activity domains of blocks walked and stairs climbed per day, based on results of focus groups conducted prior to the study. There was consensus that community members did not engage in much formal leisure-time physical activities, or in sports, but rather, walking and stair climbing related to routine activities such as visiting family and friends, going to church, grocery shopping, and laundry, were the most common forms of physical activity. The average number of blocks walked per week and flights of stairs climbed per day were tabulated, using responses to questions on the frequency and number of blocks and stairs walked regularly, as well as blocks or stairs walked regularly for the sake of exercise.

Statistical Analysis

Frequencies and means were calculated for all characteristic variables in the entire sample, and were stratified by gender, then pooled for the main analyses. We then determined the independent relationships between each characteristic and physical activity levels adjusted for age and sex. For the continuous activity variables, blocks, stairs, and leisure time activity, multivariate analyses were conducted using linear regression. For variables with 2 or more categories, the lowest category was used as the reference for comparison, and a β-coefficient was calculated indicating the average unit change in physical activity level. For the dichotomous physical activity measure of vigorous activity, multivariate analyses were conducted using logistic regression. Odds ratios were calculated comparing those who engaged in more strenuous physical activity at least once per week to those who did not. All *P* values were 2-tailed and all analyses were conducted using STATA statistical software (College Station, Tex).[27]

RESULTS

Sample Characteristics

The baseline characteristics of the 186 study participants by gender are exhibited in Table 1. The sample was predominantly female, with a mean age of 59 years, an average education of 10 years, and a modest median household income of $7,500 annually. Most of the participants (85%) were either married

or previously married, almost half had childcare responsibilities, and approximately one fifth were not currently working, primarily due to either retirement or disability. Most of those employed worked in the service industry (55%), or as operators, fabricators, or laborers (22%). The majority of the sample received Medical Assistance (42%), or had other health insurance (34%), and one fifth had no health insurance. More than one third of both men and women reported being concerned about street crime as a barrier to exercising, and a smaller minority felt they had no place to exercise.

The mean age at diabetes diagnosis was 49 years, with almost half (49%) on insulin for glycemic control, and 44% receiving oral medications only. The mean HbA_{1c} was 8.6% ± 2.1, and lipid profile measures were mostly in the normal range. The majority of both men and women had been diagnosed with hypertension, a minority had arthritis, and significantly more men than women had heart disease. Most women had lower co-morbidity scores, while almost half the men had higher co-morbidity index scores (3 or greater). The mean BMI of the group was high at 33 kg/m^2, and was distributed differently between men and women, with more men having BMIs in the lowest tertile, compared to women. Significantly more women reported complaints of hip and/or knee pain and back pain limiting activity; among men, these were the least common complaints. Approximately one fifth of both men and women reported other complaints of chest pain, fatigue, and difficulty breathing.

Perceptions of weight and body image differed between men and women. The majority of the women (80%) considered themselves to be overweight and were trying to lose weight, compared to men, and accordingly more women chose pictured body images in the larger two thirds of images as closest to their own. A majority of both men and women (64%) felt they were either equally

Table 1. Baseline characteristics of sample of 186 urban African Americans with type 2 diabetes by gender

Characteristics		Men % (*N*=45)	Women % (*N*=141)	*P* value
Sociodemographics				
Age (years)		57 ± 10	59 ± 8	.245
Education (years)		9.6 ± 3.5	9.8 ± 2.4	.704
Marital status				
Married		37.8	23.4	
Widowed/separated/divorced		46.7	63.8	.105
Never married		15.6	12.8	
Employment status				
Employed (full and part time)		35.6	29.8	
Unemployed/retired/disability		17.8	20.6	.102
Homemaker/childcare		46.7	49.6	
Household income				
<$624/month		45.5	56.8	.187
>$625/month		54.5	43.2	
Environment				
Concerned about street crime		35.6	35.0	.946
No place to exercise		17.8	15.7	.744
Clinical characteristics				
Comorbidities				
Heart disease		39.0†	19.1‡*	.009
Hypertension		70.7†	75.6‡	.535
Arthritis		14.6†	21.4‡	.344
Charlson Comorbidity Index				
1		28.9†	52.5‡	
2		22.2†	22.7‡	
3		15.6†	12.0‡	
≥4		33.3	12.8	
BMI (kg/m^2)	<30	59.1	30.5*	
	30–35	22.7	32.0*	.002
	>35	18.9	36.9*	
Hemoglobin A_{1c} (%)		9.0 ± 2.8	8.4 ± 1.9	.211
HDL (mg/dl)		43 ± 13	50 ± 13*	.003
LDL (mg/dl)		137 ± 42	143 ± 40	.367
Triglycerides (mg/dl)		132 ± 110	128 ± 70	.812
Physical complaints limiting activity				
Chest pain		17.8	13.5	.476
Back pain		8.9	24.6*	.024
Hip/knee pain		13.3	34.5*	.007
Difficulty breathing		20.0	19.3	.916
Fatigue		22.2	25.4	.671
Perceptions of weight and self-image				
Considers self overweight		55.6	78.7*	.002
Trying to lose weight		48.9	81.6*	.000
Perceived body image size	(1,2,3)	33.3	13.5*	
Increasing order	(4,5,6)	46.7	58.2*	.011
	(7,8,9)	20.0	28.4*	
Desired body image	(1,2,3)	42.2	59.6	
	(4,5,6)	57.8	39.7	.095
	(7,8,9)	0	0.7	
Perceptions of exercise and activity level				
Leisure time physical activity compared to others				
Less		20.0	34.5	
Same		40.0	33.1	.186
More		40.0	32.4	
Feel should get more exercise		68.2	81.6	.060
Feel get enough exercise to keep healthy		31.8	18.4	

Table 1. Continued

Characteristics	Men % (*N*=45)	Women % (*N*=141)	*P* value
Perceptions about harm of exercise			
Exercising may cause too low blood sugar	11.1	18.4	0.251
Exercising may cause injuries in diabetics	20.0	18.7	0.847
Exercising may cause too much weight loss	13.3	16.3	0.632
Exercising makes you feel worse	6.7	14.9	0.152
Exercise may increase appetite and weight gain	20.0	21.3	0.855

All results shown as: Percent or Mean + SD.
* $P<.05$.
† $N=41$; ‡ $N=131$.

or more active, compared to their counterparts, and that they should get more exercise, while only a minority (25%) felt they got enough exercise to keep healthy. Many of the participants held beliefs about adverse effects of exercise, such as the common belief that exercise may produce weight gain via increased appetite, and may cause injuries in people with diabetes.

Physical Activity Levels and Characteristics

Table 2 shows the average physical activity levels of the sample. Only 40% of both men and women reported exercising regularly, or engaging in more vigorous activity at least once a week. Men reported walking significantly more blocks per week compared to women, with 14% of men reporting walking ≥100 blocks per week. Of the blocks walked per week, 40% of the participants reported walking a median of 14 blocks per week purely for exercise. Men and women were similarly active in the other activity domains of flights of stairs climbed per day and leisure time activity.

Table 3 shows the differences in physical activity levels by patient characteristics, adjusted for age and sex. Of the demographic variables, only higher household income was associated with higher leisure time physical activity, compared to those in the lower income category. There were no associations between level of physical activity and age, education, or marital status. Participants who were not currently working tended to have lower physical activity levels in all 4 of the activity domains, compared to those who were employed, but these relationships were not statistically significant. On the questions regarding their environment, having no place to exercise was not associated with differences in physical activity levels, while those concerned about street crime were more likely to report engaging in strenuous or vigorous activity.

Of the clinical characteristics, higher BMI was associated with significantly lower physical activity levels in blocks walked per week and leisure time activity. Measured values of HbA_{1c}, LDL, HDL, or TG, prior history of heart disease, hypertension, or arthritis, or having a higher Charlson Comorbidity Index, were not associated with a difference in physical activity levels in any domain. Of note, individuals with physical complaints of fatigue, hip/knee pain, or back pain, were more likely to report engaging in vigorous activity every week.

Regarding self-perceptions of weight and activity levels, those who had a perceived body image in the largest third of pictured images had significantly lower activity levels in the domains of blocks walked per week and leisure time activity, similar to those with a higher BMI. Surprisingly, participants who felt they were more active in their leisure time compared to their counterparts, were actually less active in almost all of the activity domains when compared to those who already perceived themselves to be less active than their counterparts. Those who felt they were just as active as their counterparts were also less active during leisure time. In contrast, those who felt they were already getting enough exercise to keep healthy were indeed more active than those who felt they should get more exercise. Those who considered themselves overweight

Table 2. Physical activity of sample

	Men *N*=45	Women *N*=141
Exercise regularly (%)	40	29
Blocks walked per week (Mean, SD)	41 ± 8*	17 ± 2*
Blocks walked per week (%)		
0	27	37
1–49	44	53
50–99	13	10
100–149	8	1
150	6	0
Flights of stairs climbed per day (Mean, SD)	7 ± 1	9 ± 1
Flights of stairs climbed per day (%)		
0	24	14
1–9	40	43
10–19	31	36
≥20	4	6
Leisure time activity index (Mean, SD)	2.35 ± 0.09	2.44 ± 0.05
Vigorous activity ≥1×/wk (%)	24	24

* $P<.05$.

and actively trying to lose weight were not more physically active in any of the activity domains, and actually tended to be less active than their counterparts in most of the domains. Most of the perceptions about exercises's potential to cause harm were not associated with differences in activity levels, except for the perception that exercise may lead to increased appetite and weight gain, which was associated with lower leisure time activity.

CONCLUSIONS

This study supports several conclusions regarding physical activity among urban African Americans with type 2 diabetes. First, although many felt they should get more exercise, a majority still reported not engaging in regular physical activity. Second, men reported much greater walking activity than did women. Third, the data identified several characteristics predictive of low physical activity, including obesity, lower household income, and the perception of being equally or more active than one's counterparts. A predictor of higher physical activity was the perception that one is getting enough exercise to keep healthy. Fourth, weight loss efforts in this sample appeared not to commonly include physical activity. Finally, while conceptually there are many potential barriers to regular physical activity, most may not be associated with actual differences in physical activity levels.

Few previous studies have provided data on physical activity levels in male and female urban African Americans with type 2 diabetes. A review of the existing literature on physical activity patterns published since 1965 yields mostly descriptive information on physical activity patterns in American populations, which are largely restricted to structured leisure-time activities among non-minority populations. Only a few studies have been conducted specifically among African-American men and

Table 3. Age and sex adjusted differences in physical activity levels by characteristic

Characteristic	Blocks Per Week (β)	Flights Per Day (β)	Leisure Activity‡ (β)	Vigorous Activity ≥1×/wk (OR)
Sociodemographics				
Age (per year)	+0.5	−0.1	+0.08	1.0
Education (per year)	+2.8	+0.2	−0.02	1.0
Marital status				
Married	Ref	Ref	Ref	Ref
Widowed/separated/divorced	+5.0	−1.0	−0.01	0.9
Never married	+4.6	−2.0	−0.04	0.7
Employment status				
Employed (full and part time)	Ref	Ref	Ref	Ref
Unemployed/retired/disability	−10.0	−2.0	−0.03	0.7
Homemaker/childcare	+6.3	+0.5	+0.20	0.7
Household income				
<$624/month	Ref	Ref	Ref	Ref
>$625/month	−1.5	+0.71	+0.08*	0.8
Environment				
Concerned about street crime (yes vs no)	+0.6	−0.5	−0.15	4.2†
No place to exercise (yes vs no)	+7.2	−0.1	−0.09	1.8
Clinical characteristics				
Comorbidities				
Heart disease	+6.2	−0.3	−0.05	1.1
Hypertension	+2.1	−2.4	−0.07	1.4
Arthritis	−4.5	−1.3	−0.13	1.7
Charlson Comorbidity Index				
1	Ref	Ref	Ref	Ref
2	−2.7	−0.3	−0.2	0.7
3	−5.9	−0.5	−0.2	0.6
≥4	16.1	−0.1*	−0.1	1.31
BMI (kg/m²)				
<30	Ref	Ref	Ref	Ref
30–35	−13.1*	+0.2	−0.2	0.8
>35	−13.0*	−1.7	−0.2*	0.5
Hemoglobin A_{1c} (%)	+1.7	0	+0.02	1.1
HDL (mg/dl)	+0.1	0	0	1.0
LDL (mg/dl)	0	0	0	1.0
Triglycerides (mg/dl)	0	0	0	1.0
Physical complaints limiting activity				
Chest pain	+7.7	−0.7	−0.19	1.8
Back pain	+4.3	+0.6	−0.21	2.4*
Hip/knee pain	+4.1	+0.5	−0.08	2.5*
Difficulty breathing	+2.9	+0.9	−0.19	2.2
Fatigue	+4.7	+0.9	−0.24*	4.0†
Perceptions of weight and self-image				
Considers self overweight	−8.7	−0.8	−0.17	0.74
Trying to lose weight	−10.9	+1.1	−0.09	0.70
Perceived body image				
(1,2,3)	Ref	Ref	Ref	Ref
(4,5,6)	−5.2	0.0	−0.1	1.0
(7,8,9)	−17.7*	−1.0	−0.5†	0.5
Desired body image				
(1,2,3)	Ref	Ref	Ref	Ref
(4,5,6)	+4.5	−0.8	−0.1	1.1
(7,8,9)	−13.5	+0.3	+0.2	—
Perceptions of exercise and activity level				
Leisure time physical activity compared to others				
Less	Ref	Ref	Ref	Ref

Table 3. Continued

Characteristic	Blocks Per Week (β)	Flights Per Day (β)	Leisure Activity‡ (β)	Vigorous Activity ≥1×/wk (OR)
Same	−9.7	−2.3	−0.5†	0.6
More	−22.1†	−3.4*	−0.9†	0.6
Feel should get more exercise	Ref	Ref	Ref	Ref
Feel get enough exercise to keep healthy	+19.9†	−0.1	+0.3†	2.1
Perceptions about harm of exercise				
Exercising may cause too low blood sugar	+3.6	−2.1	−0.20	0.9
Exercising may cause injuries in diabetics	+4.2	−2.2	−0.15	0.8
Exercising may cause too much weight loss	+0.3	−2.2	−0.10	1.3
Exercising makes you feel worse	−0.4	−0.8	−0.18	0.6
Exercise may increase appetite and weight gain	−6.5	−1.5	−0.21*	0.5

All results shown as: β=coefficient from multiple linear regression model or OR=odds ratio from multiple logistic regression model. Ref=reference group for comparison

* $P<.05$; † $P<.001$.

‡ Leisure time activity scale as developed by Baecke et al.

. . . the data identified several characteristics predictive of low physical activity, including obesity, lower household income, and the perception of being equally or more active than one's counterparts.

women[25,28] and individuals with diabetes,[29–33] and most of the studies on activity in African Americans have included only women.[34–38] Only 2 published studies have focused on African Americans with diabetes, both of which included only women, and included physical activity as just one aspect of many self-management and health behaviors being examined.[39,40] Also, the existing literature examining determinants of, or factors influencing, physical activity is largely restricted to exercise activities and non-minority populations.[41–46] Information on physical activity and the factors that influence lifestyle physical activity in this population has been lacking.

Another strength of this study is the expanded assessment of physical activity to include community-oriented physical activity, and the wide range of personal characteristics examined. Traditionally, physical activity assessment has involved measuring participation in regular, structured leisure time activities, such as sports, or other physically active recreational activities. Studies conducted among African Americans have shown that work, home, and transportation related activities are often more common, and may be more relevant to accurately representing true overall activity, compared to more suburban and affluent populations.[25,26] Nonetheless, the characteristics primarily associated with differences in physical activity levels in the more sample-specific assessments of blocks and stairs walked, correlated with those found with the Baecke LTPA Index, an instrument that has been well-validated in non-minority populations.[22] As a measure, stairs climbed appears to be less sensitive in differentiating activity levels, given the low number of associations found in that domain. Possibly, climbing stairs is mostly functional and not often engaged in by choice. The interview question used to differentiate more vigorous or strenuous physical activity appears to identify more active individuals, but seems to be less specific among subgroups, who may be likely to perceive higher intensity levels based on the presence of other factors, such as physical symptoms of fatigue, hip/knee pain, or back pain, or fear of street crime.

Previous studies examining factors that affect mostly leisure-time activity in mostly non-minority populations, have had variable findings.[45–47] Of the sociodemographic variables, while women, and older and less educated adults have often been found to be less physically active,[47] these relationships have been less consistent in African Americans.[25,28] We found no association between physical activity level and age, education, marital status, employment status, or environment. Only lower household income was associated with lower levels of leisure time activity. Although fewer women reported exercising regularly, and walked fewer blocks per week, compared to men, even with adjustment for BMI, women were equally active in the other 3 domains, which is consistent with previous findings in urban African Americans.[25] Also in contrast to previous findings in general non-minority population studies where individuals with medical problems have been found to be less active,[47] the presence of a comorbid illness was not associated with a difference in physical activity levels. This is also similar to previous findings in African Americans, where little association was found between leisure time physical activity and various health status variables.[25] However, the complaint of fatigue limiting activity appears to be important.

Even in the face of diabetes, obesity, both measured and self-perceived, is associated with low levels of physical activity. In this cross-sectional study, we cannot determine whether low physical

activity levels led to obesity, or if having a higher body weight fostered inactivity. Surprisingly, considering oneself overweight, actively trying to lose weight, or having a leaner desired body image were not associated with higher activity levels in any domain. This suggests that weight loss efforts among this sample did not commonly include physical activity. It also appears that levels of physical activity may be commonly overestimated, as the perception of being more active than one's counterparts was actually associated with significantly lower activity levels across most of the activity domains. Potentially, a more useful screening question is whether the individual perceives him or herself to be getting enough exercise to keep healthy, which was one of the most significant predictors of higher levels of physical activity. This could be considered to be a correlate, or indication, or sense of efficacy that a number of previous studies have found to be predictive of higher physical activity.[28,40] Regarding other perceptions of physical activity, it is notable that many misperceptions about possible harmful effects of exercise did not appear to affect activity levels; however, the belief that exercise may increase appetite and weight gain appeared to have a negative affect on exercise levels, and, therefore, is probably an important myth to dispel.

Limitations of our study must be acknowledged. Because of its cross-sectional design, we were only able to identify associations between characteristics and physical activity level at one point in time; we cannot establish causality. Secondly, this was also an exploratory study, which carries a higher risk of type I error. Attempting to reduce this risk by setting alpha to a more stringent level of 0.01 to represent statistical significance, still leaves most of the physical activity differences significant. Thirdly, our activity measures were reliant on self-report, which increases the possibility of misinformation, or recall bias. To help account for this, simple factual questions were asked regarding places subjects walked, and the distances between them, which should have reduced bias. Additionally, these participants were volunteers in a randomized controlled trial, which may have selected more motivated individuals, therefore possibly limiting its generalizability. However, comparison of our participants to the non-responders revealed that our study participants were similar, except for exhibiting a lower HbA_{1c}.[19]

Despite its limitations, this study has several possible implications. It highlights the need for culturally appropriate strategies and interventions to increase physical activity in this population, as physical activity levels appeared to be sub-optimal. Also, knowledge and perceptions about physical activity should probably be assessed for each individual, and while it appears that intentions are important, they do not appear to be sufficient to increase individual physical activity levels. Special attention may need to be directed toward the overweight and obese, those with lower income, as well as those who appear confident about their activity levels, in relation to others. Also, if routine lifestyle activities, such as stairs and blocks walked, are more common forms of physical activity in urban minority populations such as this sample, there may be opportunity for physical activity levels to be increased by encouraging an increase in these activities, just for the sake of exercise, especially among women. Further study on the most prevalent physical activities and their determinants in this population may be helpful in developing targeted and culturally relevant interventions designed to increase physical activity levels in this high-risk population.

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