DOES WEIGHT STATUS INFLUENCE PERCEPTIONS OF PHYSICAL ACTIVITY BARRIERS AMONG AFRICAN-AMERICAN WOMEN?

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Background: Many African-American women fail to participate in regular physical activity. Weight status may influence physical activity barriers. This study examined the frequency and type of barriers.

Methods: Participants in this study were enrolled in Project EXE-L (Exercising Ladies Excel), a six-month, church-based, randomized trial of moderate-intensity physical activity based in Baltimore city and county in Maryland. Participants were composed of African-American women who attended one of the participating churches, had friends who were church members, or who lived in neighborhoods surrounding one of the churches. Individuals who were between the ages of 25 and 70 years, were not regularly physically active (defined as not engaging in moderate-intensity activity more than three times per week), and were able to participate in moderate-intensity activity met eligibility criteria to participate in the trial. Barriers to physical activity were evaluated with the Steinhardt/Dishman Barriers for Habitual Physical Activity Scale at baseline.

Results: One hundred twenty women were classified as normal weight (body mass index [BMI]: <25 kg/m^2), overweight (BMI: 25–29.9 kg/m^2), or obese (BMI: ≥ 30 kg/m^2). Obese participants were more likely to report ''lack of motivation'' as a barrier compared with normal-weight participants (63% vs 31%). Normal-weight and overweight participants were more likely to report no barriers compared with the obese (31%, 0%, 5%, respectively, $P<.05$).

Conclusions: Barriers for African-American women may vary by BMI status. By defining these unique barriers, effective physical activity interventions can be developed. (*Ethn Dis*. 2006;16:78–84)

Key Words: African-American Women, Barriers, Obesity, Physical Activity

INTRODUCTION

Although the health and psychosocial benefits of regular physical activity are well known, most of the US population fails to participate in recommended levels of physical activity.[1] Current recommendations for physical activity are at least moderate-intensity activity (like brisk walking) for 30 minutes on most days of the week.[2] Women, in particular, are more likely to be sedentary compared with men.[3] Among every category of social class, women report a higher level of physical inactivity compared to men.[4] African-American women are among the least physically active subgroups in the United States.[3] The most recent National Health Interview Survey data (1999–2001) found that 55% of African-American women engaged in no leisure-time physical activity.[5] Hispanic females had a similar prevalence (57%), while prevalence of inactivity was lower in Caucasian women (38%).[5] Although a difference in physical activity exists across socioeconomic status (SES) (higher SES, higher activity), African-American women are less active than their SES-equivalent peers, and high levels of physical inactivity are evident at all SES levels.[6]

In addition to sex and racial discrepancies in physical activity level, individuals who are overweight (body mass index [BMI] $\geq$25–29.9 kg/m^2) or obese (BMI ≥ 30 kg/m^2) are less likely to be physically active than their normal weight counterparts.[7] Because overweight and obesity is prevalent in more than three fourths of African-American women,[8] these factors are likely to affect the proportion of African-American women who are physically active.

To determine strategies that can be effective for promoting physical activity, relevant barriers to physical activity in this population need to be identified.

African-American women, with a high prevalence of sedentary lifestyles, obesity, and overweight, have higher rates of sedentary-related diseases such as coronary heart disease, hypertension, and diabetes.[9] With these combined factors, this population can greatly benefit from increased physical activity. To determine strategies that can be effective for promoting physical activity, relevant barriers to physical activity in this population need to be identified. One study found that being ''too fat'' was reported as a barrier to physical activity by women in an urban, representative population survey of Australian adults.[10] Obesity and overweight status may additionally influence the perception of the number and type of barriers to physical activity in African-American women.

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Although barriers to physical activity have been reported for Caucasians, few studies have fully explored barriers among other population subgroups. Among women of varying ethnic subgroups (ie, African Americans, Caucasians, Latinos, Native Americans), caregiving duties and lack of energy were reported as barriers to physical activity.[11,12] A limited number of studies have suggested that barriers most commonly cited by African-American women are time, money, motivation, age, family obligations, weather, and neighborhood constraints.[13–16] Some of these barriers are similar to those reported by women of other racial/ethnic backgrounds. For example, lack of time is a commonly-reported barrier across many samples.[17] However, due to different levels of obesity, SES, and cultural background, specific barriers to physical activity may be unique in African-American women. Further, previous studies have, for the most part, identified barriers with qualitative methods[14,17–19] and/or nonstandard instruments.[15,16] While qualitative work can provide information on identifying barriers, samples are usually small and may not be generalizable to larger population subgroups. Moreover, the degree to which a barrier impedes physical activity cannot be ascertained from qualitative work, nor can the relationship among barriers and physical activity level and other physical activity correlates be ascertained.

The purpose of this study was to examine the frequency and type of barriers to physical activity reported by African-American women by using a barriers instrument that has been validated in other populations.[20] Because participation in physical activity tends to differ by weight status, we also wanted to assess whether the number and/or type of barriers to physical activity varied across normal, overweight, and obese women. Finally, we wanted to determine whether demographic factors influenced the number of barriers an individual was likely to report.

METHODS

Participants in this study were enrolled in Project EXE-L (Exercising Ladies Excel), a six-month, church-based, randomized trial of moderate-intensity physical activity. Churches were recruited in Baltimore City and Baltimore County to participate in the trial if a representative from the church (typically a pastor) estimated that at least 10 members would be willing to participate in the study.

Participants were composed of African-American women who attended one of the participating churches, had friends who were church members, or who lived in neighborhoods surrounding one of the churches. Individuals who were between the ages of 25 and 70 years, were not regularly physically active (defined as not engaging in moderate-intensity activity more than three times per week), and were able to participate in moderate-intensity activity met eligibility criteria to participate in the trial. Exclusion criteria were broad and limited to criteria that may have placed potential participants at risk if they increased their physical activity, including: no medical condition (such as history of myocardial infarction or stroke within six months), uncontrolled hypertension, diagnosis of type 2 diabetes mellitus, or use of beta-blocker medication (which could interfere with the results of the maximal treadmill exercise test).

Measurements

Participants were scheduled for two clinic visits lasting approximately two hours each to collect demographic information, physical activity level, cardiovascular risk factor status, and complete psychosocial instruments. They were considered part of the study if they completed one of the two visits. Registered nurses and technicians at the Johns Hopkins Bayview General Clinics Research Center who were trained to administer the measurement protocol performed all measurements. In most cases, the first visit determined cardiovascular risk factor status. During the second visit, maximal treadmill exercise testing was performed.

Demographic information such as age, income, employment, and education were determined by self-report. Height, without shoes, was measured with a wall-mounted stadiometer. Weight, in light indoor clothes without shoes, was measured with a balance beam scale. Body mass index (BMI) was calculated as weight in kilograms/height in meters squared, and participants were categorized as normal weight (BMI <25 kg/m^2), overweight (BMI 25–29.9 kg/m^2), or obese (BMI ≥ 30 kg/m^2).

Physical activity was assessed from two self-report physical activity instruments, the Stanford seven-day Physical Activity Recall (PAR)[21,22] and the Yale Physical Activity Survey (YPAS).[23] Both of these instruments have been used in studies with African-American samples.[24–26] We found that the instruments were correlated with each other and associated with estimated maximal oxygen uptake and BMI in African-American and non-African-American older adults who were predominantly women (78%).[24]

Based on previous focus groups conducted with African-American women living in Baltimore, the PAR was modified to provide examples of physical activities that are more common among urban African-American women. Previous studies have found that the two-week test-retest reliability is $r=0.67$.[21] The PAR is associated with other measures of physical activity in validity studies.[22]

The YPAS was designed to assess lower- and moderate-intensity physical activity in older adults.[23] This survey was used because African-American

women are known to be sedentary, and this instrument would differentiate physical activity levels among these sedentary women. Two week test-retest reliabilities range from $r=0.42$ to 0.65 across indices.[23] The YPAS indices correlated significantly with maximal oxygen uptake, percent body fat, and BMI,[23] and are sensitive to change after an exercise intervention.[24]

Barriers to physical activity were evaluated with the Steinhardt/Dishman Barriers for Habitual Physical Activity Scale.[20] This instrument was chosen because it included items that were identified as barriers in focus group work we conducted with African-American women,[27] and thus, has face validity for our targeted sample. For the present study, we removed the "limiting health" scale because individuals with significant health limitations were excluded from study participation. Three items, "interferes with work," "interferes with school," and "lack of facilities," that we determined were either redundant or not applicable were also removed. Finally, we added one item that queried about personal safety as a barrier because our qualitative work indicated that it was a salient barrier for this population.

Because the barriers scale was developed on a Southern college sample, and validated in predominately White, upper-middle class workers, rather than use the published barriers subscales, we conducted a principal components analysis to determine if meaningful subscales of barriers could be identified. Four subscales emerged: "motivation," a two-item scale with internal consistency $\alpha=0.77$; "environmental," a two-item scale with internal consistency $\alpha=0.76$; "energy," a two-item scale with internal consistency $\alpha=0.75$; and "time constraints," a four-item scale with internal consistency $\alpha=0.69$.

Analysis

Data analysis was conducted on the frequency and type of barriers to physical activity on the overall sample and by BMI categories. Demographic variables were compared across BMI categories. Analysis of variance was used to assess differences in continuous variables, such as age and physical activity, across BMI categories. Chi-square analysis was applied for the categorical variables (eg, occupation, education, barrier frequencies). Fisher exact test was used when analyses were based on small numbers (eg, cell number less than five). Frequency and type of barriers were determined for each BMI category.

For descriptive purposes, barriers were ranked according to the participants' endorsement of an item as a high barrier. High barriers were defined as those endorsed by the responses "strongly agree" or "somewhat agree." All other responses were categorized as a low barrier. Percentages of high barriers were determined for each barrier item, which were then ranked in descending order. Participants were grouped into those who reported high versus low barriers. A total number of high barrier items was calculated for each participant. The frequency of participants who reported no barriers (ie, endorsed "disagree," or "strongly disagree" response) was also assessed. Finally to determine if demographic factors predicted high versus low barriers, logistic regression was applied with age, BMI, income, and education variables included in the model.

Table 1. Self-reported physical activity level of participants stratified by BMI status

Physical Activity Items	Normal ($n=13$) Mean (SD)	Overweight ($n=29$) Mean (SD)	Obese ($n=78$) Mean (SD)
7-Day Physical Activity Recall			
Est daily energy expenditure (kcal/kg/day)	39.8 (6.6)	40.1 (10.2)*	37.2 (5.7)
Moderate activity (h/wk)	2.0 (2.3)	1.7 (2.4)	1.1 (1.6)†
Hard/very hard activity (h/wk)	0.4 (0.5)	0.7 (1.0)*	0.4 (0.8)
Yale Physical Activity Scale			
Vigorous index	8.8 (9.6)	12.8 (12.4)	10.2 (11.1)
Walking index	7.4 (5.6)	11.6 (8.1)	11.3 (11.6)
Moving index	10.8 (4.0)	10.8 (3.5)	9.3 (4.0)
Standing index	4.0 (2.2)	2.7 (1.4)	3.4 (2.1)
Sitting index	2.2 (0.8)	2.4 (1.0)	2.5 (1.2)
Activity summary score	33.8 (17.0)	40.7 (15.6)	37.1 (19.3)
Weekly energy expenditure (kcal/wk)	5458 (3128)	5965 (3003)	5701 (3957)
Total weekly time (h/wk)	28.3 (17.0)	30.9 (14.6)	29.9 (21.3)

BMI=body mass index.
Normal weight: BMI <25 kg/m^2; overweight: BMI 25–30 kg/m^2; obese: ≥30 kg/m^2.
* $P<.02$; mean values for overweight greater than normal and obese.
† $P=.022$; mean values for obese less than normal and overweight.

RESULTS

Two hundred seventy-four women initially expressed interest in the trial. Sixty-seven did not participate because of subsequent lack of interest before baseline testing, and 11 were excluded during baseline testing because they did not meet eligibility criteria. Between four and 72 individuals were recruited from each of the 11 churches participating in the trial, for a total of 196 participants. The present analysis is limited to the 120 women who completed the baseline questionnaire regarding barriers for physical activity.

The overall mean age of the sample was 48 ± 11 years. Sixty percent of the women were married, 77% had at least some college education, and 78% were employed. Classification into BMI categories indicated that 13 participants

Table 2. Rank of reported barriers to physical activity, by BMI category and overall

Barrier	Normal	Normal Rank	Overweight	Overweight Rank	Obese	Obese Rank	Total N (%)	Overall Rank
Time constraints subscale								
No time for exercise	7 (54%)	1	14 (48%)	2	39 (50%)	2	60 (50%)	2
Too busy to exercise	6 (46%)	2	14 (48%)	2	37 (47%)	3	57 (48%)	3
Too many family obligations	5 (23%)	3	11 (38%)	3	23 (29%)	5	39 (33%)	4
Inconvenient	3 (23%)	5	8 (28%)	4	22 (28%)	6	33 (28%)	6
Energy subscale								
Too fatigued by exercise	2 (15%)	6.5	4 (24%)	5.5	10 (13%)	9	19 (16%)	8
Too tired	2 (15%)	6.5	7 (24%)	5.5	29 (37%)	4	38 (32%)	5
Motivation subscale								
Exercise is boring	1 (8%)	7.5	6 (21%)	6	14 (18%)	8	21 (18%)	7
Lack of motivation	4 (31%)	4	15 (52%)	1	49 (63%)	1	68 (57%)	1
Environmental subscale								
Weather	1 (8%)	7.5	2 (7%)	8	15 (19%)	7	18 (15%)	9
Concern about safety	0	8	4 (14%)	7	8 (10%)	10	12 (10%)	10

Reported either a 1 or 2 on a scale of 1 to 5, or ''strongly agreed'' or ''agree'' for the barrier item.

were normal weight, 29 were overweight, and 78 were obese. Demographic variables were not significantly different across BMI categories. Measures of self-reported physical activity are displayed in Table 1. Most physical activity items were similarly distributed across BMI categories, although estimated daily energy expenditure and hours spent in hard/very hard activity, determined by PAR, were significantly higher in overweight compared with the normal weight and obese categories ($F_{(1,118)}=6.52$; $P=.012$ and $F_{(1,118)}=5.64$; $P=.02$, respectively). Hours spent in moderate activity was significantly lower for the obese compared with the normal and overweight categories ($F_{(1,118)}=5.39$; $P=.022$).

The total barrier scale and the time constraints subscale were significantly correlated with the walking index, determined from the YPAS ($R=0.22$, $P<.01$; $R=0.24$, $P<.01$, respectively). The sitting index correlated with the motivation subscale ($R=0.21$; $P=.03$). No other correlations among the physical activity items were found.

Table 2 presents the percentage and ranking of each barrier item by BMI status. Obese participants were more likely to report ''lack of motivation'' as a barrier compared with the normal weight participants (63% vs 31%, $P<0.05$). Participants rarely reported ''boredom,'' ''weather,'' and ''safety'' as barriers to physical activity. When comparing the frequency of participants reporting no barriers compared with one or more barriers, we found that lower BMI categories were associated with a greater likelihood of reporting no barriers (31%, 0%, 5% for normal weight, overweight, and obese, respectively [Mantel-Haenszel $\chi^2=5.58$; $P=.018$]) (data not shown).

An additional analysis was conducted to determine if there were differences in mean levels of barriers. Table 3 presents the means and standard deviations for the BMI categories. Mean barrier scores by BMI group were not significantly different in either the barrier subscales or for the total barrier score (ie, total barriers score $F_{(1,117)}=0.94$; $P=.33$).

Both univariate (not reported) and multivariate logistic regression indicated that age, BMI, income, and education did not predict whether an individual reported high or low barriers from the total barriers scale (Table 4). Preliminary multivariate analysis of variance procedures that included the same variables but did not dichotomize the barriers scale also yielded nonsignificant results.

DISCUSSION

The current study provides a detailed analysis of perceived barriers to physical activity in a population of African-American women. As a group, the sample had demographic and physical

Table 3. Means and SDs of the barrier subscales stratified by BMI status

Barrier Subscales	Normal Mean (SD)	Overweight Mean (SD)	Obese Mean (SD)	Total Mean (SD)
Time constraints	13.7 (5.4)	11.9 (3.5)	12.9 (4.5)	12.8 (4.4)
Energy	7.8 (2.4)	7.0 (2.2)	7.2 (2.2)	7.2 (2.2)
Motivation	8.3 (1.8)	6.4 (2.4)	6.4 (2.2)	6.6 (2.3)
Environmental	8.8 (1.3)	8.4 (1.9)	8.3 (1.9)	8.4 (1.8)
Total barrier	38.7 (8.7)	33.4 (6.4)	34.8 (7.2)	34.9 (7.3)

Range of subscale scores: time constraints range 4–20, energy range 1–10, motivation range 2–10, environmental range 3–10, and total barrier range 17–50.

Table 4. Multivariate logistic regression examining demographic predictors of reporting high vs low barriers*

Variable	Estimate	Standard Error	Odds Ratio (95% CI†)
Age (y)	−0.024	0.018	0.97 (0.94–1.01)
BMI (kg/m^2)	−0.017	0.029	0.98 (0.92–1.04)
Income	−0.024	0.128	0.98 (0.76–1.26)
Education	0.202	0.142	1.22 (0.92–1.61)

* High barriers: ≥34.9; low barriers: <34.9 for total barrier score.
† CI=confidence interval.

We found the most commonly reported barriers to physical activity were "no time" and "lack of motivation."

activity level differences compared with other African-American samples. Eighty-nine percent of our participants were overweight or obese compared with 75% nationally.[8] Our sample had higher education and income levels than the average African-American woman. Based on the PAR score, the participants engaged in more physical activity than is typically observed. On average, the women spent more than 1.5 hours per week in moderate-to-vigorous activity. While this amount is not enough to meet current recommendations,[2] many of the women were engaging in some physical activity. Because physical activity was measured from self-report and the women entering the study were also joining a physical activity intervention, desirability bias may have caused physical activity level to be overreported.

We found the most commonly reported barriers to physical activity were ''no time'' and ''lack of motivation.'' These two barriers were reported by more than half of all participants, while the other 12 possible barriers were reported infrequently. ''Lack of motivation'' and ''no time'' are consistently reported in the literature across different racial groups, including African-American women.[11,12,15,16] However, this sample of African-American women did not report many other barriers that are commonly observed in the literature. Barriers related to the physical environment, such as safety and weather, were not perceived as barriers. These barriers may be more salient if individuals perceived exercise as an activity that they only can do outdoors. Data were collected over a two-year period, so all seasons were represented. The fact that only two of the possible barriers examined in this study were commonly reported suggests that African-American women may perceive additional unique barriers that were not examined in this study. Although we used qualitative studies to identify barriers among African-American women before this study,[27] we were not able to discern barriers that carried a high degree of relevance in our current sample.

When comparing perceived barriers between normal weight, overweight, and obese women, the results differed slightly, although similar trends were observed. The comparison of reported barriers stratified by BMI has not been previously reported to our knowledge. Overall, those in the normal-weight category were more likely to perceive no barriers than those in the overweight or obese category.

Analyses that were performed to examine the effect of demographic variables, such as age, education, and income, on perceived barriers did not find any significant associations. However, recent literature suggests that age, education, and income are all associated with the level of physical activity in women of a variety of racial/ethnic backgrounds.[11] Education and income are positively associated, while age is negatively associated with level of physical activity. Thus, we thought that these demographic factors would also be associated with number of perceived barriers.

Overweight women reported more physical activity than normal-weight or obese participants. We expected that the normal-weight participants would be the most active, and obese participants would be the least active. However, only 13 participants were in the normal-weight category, and they may not be representative of normal-weight African-American women.

Few significant correlations were detected among physical activity and the barrier scale and subscales. Physical activity determinants studies often indicate the barriers to physical activity are associated with physical activity.[28] The low endorsement of barriers, a potential response bias previously discussed, and a sample interested in joining a physical activity intervention may have contributed to these results.

Although this study provides descriptive information regarding perceived barriers to physical activity, the study population is not representative of all African-American women and may not be generalizable to African-American women who do not attend church. This sample included self-selected individuals who were interested in an exercise program; consequently, reported barriers may differ from the general African-American female population. This study also recruited women who attended church. Spirituality may influence the frequency of type of barriers reported. Additionally, this study is specific to African-American women, and African-American women have different perceptions of obesity and body image than non African-American women.[29] Our analysis also relied on broad categories of BMI and did not include a representative proportion of normal-weight women. Be-

cause of the few participants who were normal weight, we could not fully examine differences in barriers by weight status. Finally, the barriers scale may not have been appropriate for this sample. Although we chose the scale based on its congruence with barriers identified in focus groups, it has not been validated in an African-American population. Other barriers may be more salient to African-American women.

In conclusion, we found that common barriers to physical activity were lack of time and motivation. Other barriers were not commonly reported, regardless of BMI status. Since this African-American female population has much lower rates of physical activity compared to other populations but only defined lack of time and motivation as common barriers, other barriers that have not been previously described may contribute to the low levels of physical activity reported. Conversely, lack of time and lack of motivation may be particularly potent barriers that preclude participation even without facing additional barriers. Future work evaluating conflicting time demands and motivation factors may shed light on barriers that African-American women face regarding physical activity participation. Interventions that include time-management skills and motivational strategies may be particularly useful for African-American women.

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