Published in final edited form as:

J Am Coll Health. 2010 ; 58(4): 327–334. doi:10.1080/07448480903501772.

Physical Activity Behaviors of Students of a Rural Historically Black College

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Abstract

Physical activity can have a positive impact on health disparities among African Americans.

Objective—In this study, we assessed physical activity behaviors and correlates of students of a Historically Black College.

Methods—In September 2004, an online survey and pedometers were used to measure physical activity behavior and correlates.

Participants—A convenience sample of 106 students completed the survey and received pedometers. Pedometer data were submitted online for 5 weeks.

Results—One hundred and six students completed the survey. Twenty-eight percent and 41% of respondents met recommendations for moderate physical activity and vigorous physical activity, respectively. Week 1 daily pedometer step count average was 8,707. Most students reported positive outcome expectations for physical activity. Students submitting pedometer data were less likely to meet MPA recommendations than students only completing the survey.

Conclusions—African American students feel positive about physical activity yet most do not meet recommended levels.

Keywords

physical activity; pedometer; college student; African American

Few behaviors have the potential to decrease the risk of so many negative health outcomes as regular physical activity (PA). Despite the well-established benefits of regular PA, approximately 70% of Americans do not meet the levels recommended.¹ Data from the 2007 Behavioral Risk Factor Survey (BRFSS) indicated that only 48.8% of the respondents met the Healthy People 2010 (HP2010) objectives for PA, defined as engaging in at least 30 minutes of moderate PA 5 or more days per week or 20 minutes of vigorous PA 3 or more days per week.² Only 40.4% of Black respondents met the recommendations. Rising inactivity rates are linked to increases in obesity, diabetes, heart disease, and certain cancers, which are referred to by some as the “diseases of inactivity.”³ Increasing levels of PA can play an important role in the prevention of obesity and the mitigation of the secondary conditions associated with obesity. Minority populations are disproportionately affected by negative health outcomes associated with physical inactivity and obesity.

Healthy People 2010 objectives specifically call for increasing moderate and vigorous PA levels among Americans from 15% to 30% and from 23% to 30%, respectively, and targeting

postsecondary educational settings to promote PA.⁴ Rates of PA decline greatly during adolescence and young adulthood^{5–7} and this may be even more pronounced among minority populations.⁸ The Fall 2008 National College Health Assessment data revealed that only 19.1% of respondents reported 5 or more days of moderate physical activity and 28.6% reported 3 or more days of vigorous physical activity.⁹ This is consistent with other college student research studies that found “no regular PA participation” being reported by 56% to 80% of college student respondents.^{9–12} A review of studies estimating college student PA levels found that there are few studies examining minority student physical activity.¹³

PA intervention programs targeting minority college students could prevent or reduce negative health outcomes by establishing healthy behaviors at a time when lifelong health habits are being shaped.³ Researchers focusing on African American students have studied a wide range of health behaviors including PA.^{14–16} In addition to measures of PA, associated factors such as stage of readiness for PA adoption, outcome expectations, and self-efficacy have been assessed among various student populations and can be useful in designing tailored health promotion interventions.^{6,17–21}

A better understanding of rates of PA and the associated psychosocial variables among African American college students will allow for more effective interventions to be developed and potentially reduce negative health disparities for African Americans in the future. To date, no studies have examined physical activity levels among African American students using survey and pedometer data.

Objectives

The purpose of this study was to assess psychosocial correlates of PA and baseline PA levels of African American college students at a Historically Black College (HBC) in the rural south using an online Web-based survey and pedometers. This information was collected to inform the development of a campus-wide health intervention and was the first phase of a multiyear project investigating health behaviors of African American college students funded by the National Institutes of Health, Center on Minority Health and Health Disparities, EXPORT Center.

METHODS

Study Setting

The study was conducted at a small southern rural Historically Black College (HBC) with 664 full-time undergraduate students enrolled at the time of the study.

Instrumentation

To assess levels of PA, we conducted a cross-sectional study among a self-selected convenience sample of students. Two instruments were used to evaluate PA. The first instrument was a self-administered 30-item online Student Physical Activity Habits (SPAH) survey that was a composite of existing items and scales previously used in physical activity research. The SPAH survey used questions about moderate and vigorous PA originally from the Behavioral Risk Factor Surveillance System (BRFSS) as well as questions concerning individual and environmental factors associated with PA behavior from other established measures. Psychosocial variables included exercise stage of change, exercise outcome expectations, and self-efficacy to engage in PA. Measures addressing each of these areas were adapted from existing measurement scales developed by Marcus et al,¹⁷ Sallis et al,²² and Resnik.²³ Marcus et al¹⁷ developed a 5-item stages of change instrument specifically for exercise. Marcus et al¹⁷ and Sallis et al²² developed exercise self-efficacy measures of varying length (15 and 8 items, respectively) consisting of 5-point Likert-type scales measuring how confident

respondents felt about their ability to motivate themselves to participate in exercise related situations. Resnick²³ developed the exercise outcome expectations instrument that considers both positive and negative outcome expectations associated with exercise. The SPAH survey was pretested for usability with 10 undergraduate students from the HBC. Students had limited access to campus computer labs and personal laptop computers were uncommon among the student body. We piloted the online survey to evaluate the time required to complete the survey and the students impression of the time required to complete the survey. Student reviewers accessed and completed the survey in the computer lab setting that would be used by most prospective participants. The students indicated that the online survey was easily accessible, easy to understand, and easy to use. They also indicated that it was too long and felt most fellow students would not take the time to complete it. The students took approximate 45 minutes to complete the original version of the SPAH survey. The survey was shortened and after a subsequent pretest, shortened a second time. Items not directly linked to the research question were removed from the survey. The final version of the online survey took approximately 25 minutes to complete.

The second instrument used to assess physical activity was the Yamax Digiwalker SW200 pedometer. Yamax pedometers have been found to consistently provide accurate data and are a brand frequently used in pedometer research studies and the SW-200 model has been used as a criterion model by which other pedometers are evaluated.²⁴ The pedometer measured PA in units of “steps per day.” Pedometers are low-cost tools that provide objective measures of daily PA. Tudor-Locke^{25,26} and Bassett²⁷ and colleagues have provided extensive reviews of the history and use of the pedometer. The Digiwalker SW 200 requires no calibration.

Sampling

Prior to recruiting students into the study, permission was granted to conduct human subject research from the Institutional Review Board. All students, faculty, and staff at the HBC were invited to participate in the campus-wide PA study. Only full-time students were included in this analysis. Participant recruitment consisted of a multichanneled information campaign promoting the study. Promotional channels included mailbox cards, flyers posted in classroom buildings and dorms, classroom announcements by faculty, table tents in the campus cafeteria, 3 × 4 foot color posters placed in buildings on campus, and a 1-day promotional campaign at the campus cafeteria. All recruitment and promotional materials were designed and distributed by undergraduate student members of the EXPORT research team and are described in a forthcoming paper by the author. Recruitment materials included information about the PA study and a Web address to enroll in the study. Participant incentives included a pedometer that they could keep and an award of points toward “Cultural Enrichment Credits” that students are required to accumulate throughout their 4-year undergraduate experience.

Students who chose to access the Web address were informed of the details of the study and other requisite information as part of informed consent. If the student granted consent, they were electronically forwarded to the Student Physical Activity Habits Survey. Upon completion of the survey, students were instructed in how to obtain a pedometer. Pedometers were made available over a period of 10-days and students could obtain them at the research office on campus or at the cafeteria during the 1-day promotional event. Each participant was instructed in the proper use of the pedometer per guidelines discussed in Tudor-Locke²⁶ and Bassett et al.²⁷ Participants were asked to wear the pedometer over a 5-week period and to submit their “daily step counts” at the end of each week through an online Web site. A calendar-style logbook was given to each participant to record daily steps and to remind them about proper pedometer usage and the Web address for submitting weekly “step count” data electronically. Participants were asked to continue their normal physical activity routine during the first week and to record their accumulated “step counts” taken during the day. After the

first week, a low-dose print communication campaign was implemented on campus to promote use of the pedometers and remind participants to submit their steps online. The communication campaign consisted of flyers, color posters, and table tents placed in classroom buildings, dorms, and the cafeteria. The campaign messages were generated by the student researchers with assistance from the principle investigator and consisted of motivational phrases that reinforced benefits of being more active (eg, “Be Tigerlicious... Get Active” and “Save Gas... Walk to Class”). Each message included a logo of a tiger paw and the tag line “Add 2000 steps to your day for a Healthy, Wealthy, and Wise future. Sponsored by Tiger Team.... Roaring for your health. EXPORT grant.” A new message was disseminated each week to encourage participant attention to the message.

At the end of the 5-week period, participants were asked to return data sheets of “steps per day” at designated campus drop-off sites. Participant incentives for the pedometer portion of the study included ten dollar gift cards awarded weekly to 10 randomly selected students who submitted data that week.

Data Analysis

Data from the online Web survey were imported into an Access database where they were systematically reviewed for questionnaire completion and data aberrations. Descriptive statistics, correlations, and univariate analysis of variance were calculated with the final data set using SPSS version 14.0. Statistical significance was set at $p = .05$ for all inferential tests.

RESULTS

The overall purpose of this study was to assess select PA correlates and baseline physical activity levels among a minority student population using an online Web-based data collection system and pedometers. Among the 114 full-time undergraduate students who submitted data, 8 were excluded from analysis due to incomplete data (2 missing gender and 6 missing moderate physical activity [MPA] or vigorous physical activity [VPA] data), making the final sample size for this study $n = 106$ (overall response rate = 16.0%). Of these students, 35% ($n = 37$) submitted pedometer data electronically at least once during the 5-week period and 30.2% ($n = 32$) submitted data electronically at the end of week 1.

Sample Demographics

Among the students included in the survey portion of the study, the majority lived on-campus (86.5%), with females making up the majority of the sample (72.6%). Most participants (89.5%) identified themselves as African American, with a smaller number of students (10.5%) identifying themselves as something other than White (eg, Asian, African, non-white Hispanic, etc). Table 1 contains age, academic year, and BMI status data for the total study sample and by gender.

Physical Activity Correlates

Stages of Change—The distribution of students across stage of change for PA is included in Table 2. These data are similar to those of other investigators examining behavioral readiness to adopt PA among African American college students.^{6,13,18–20}

Outcome Expectations—Questions concerning exercise outcome expectations consist of Likert-type scales ranging from 1 (very unlikely) to 5 (very likely). Respondent data were grouped as “very unlikely” (scores of 2 or less) or “very likely” (scores of 4 or higher) for analysis. Responses to questions concerning positive and negative outcome expectations for PA revealed that, overall, students expect PA to promote and protect their health, help them look and feel better and manage stress (Table 3). In addition, a majority (62%) of the

respondents expect PA to be fun. The highest scores for negative outcome expectations associated with PA included soreness and time to get ready and clean up after PA (Table 4).

Self-Efficacy—Questions concerning confidence to engage in PA also included Likert-type scales from 1 (not at all confident) to 5 (very confident). Response data were grouped as “high confidence” (scores of 4 or higher) or “low confidence” (scores of 2 or lower). A majority (52.4%) of the students reported high confidence to set aside 30 minutes per day most days of the week to engage in continuous PA. Likewise a majority of students had high confidence to exercise even if done on their own (65.1%) (Table 5).

Student Physical Activity Levels

Questions from the Behavioral Risk Factor Surveillance System were used to assess moderate and vigorous PA levels. Almost 30% of the students met recommended levels for moderate physical activity (MPA) (reported accumulating at least 30 or more minutes per day, 5 or more days per week of MPA) and 42.5% of the students met recommended levels for vigorous physical activity (VPA) (reported sustaining at least 20 minutes a day of VPA, 3 or more days a week) (Table 6). Students who reported at least some PA but did not meet the threshold for MPA or VPA recommendations were described as having “inadequate” levels of PA.

Thirty-seven students submitted pedometer step data at least 1 week during the 5-week period for a total of 130 daily step submissions. Fifty-one percent of these students ($n = 19$) submitted data for all 5 weeks. Daily “step” averages for week 1 ranged from 3,423 to 15,174 steps per day (mean $\pm$ SD = 8,707.2 $\pm$ 3,571; $n = 32$). Submission of weekly “step count” data declined slightly over the 5-week period (Table 7), yet weekly step averages varied little across the 5 weeks. To segment students into varying levels of PA, we grouped students into categories of “high” (10,000 or more steps per day) or “low” (5,000 or fewer steps per day) daily step counts.²⁶ Pedometer participants acquiring a weekly average of 5,000 or fewer steps per day ranged from 8.3% to 11.5% across the 5 weeks. Students acquiring a daily average of 10,000 or more steps per day varied from week to week but never exceeded 42% of the pedometer participants.

“Survey Only” Versus “Survey and Pedometer” Participants

We compared students who only completed the survey to those who completed both the survey and the pedometer portions of the study (Table 8). A t test was used to determine differences in age and body mass index (BMI) and a chi-square was used to compare moderate and vigorous PA levels and stages of change. There was a significant difference between groups for the percentage of participants meeting moderate PA recommendations. Participants who submitted pedometer data were less likely than “survey only” participants to meet moderate PA recommendations. The 2 groups did not differ in age, gender, BMI, or stage of change.

COMMENT

Historically Black Colleges and Universities can have a positive impact on future health disparities among African American youth by offering programs that support lifelong protective behaviors such as regular physical activity. Physical inactivity is associated with an increased risk of heart disease, diabetes, and cancer.⁴ PA behaviors of senior college students are predictive of their PA behaviors in adulthood, with one study reporting that approximately 85% of physically active college seniors remained physically active as long as 10 years after graduation.¹³

This study examined PA correlates and PA behaviors using an online survey and pedometers and was part of a multiyear project conducted at an HBC as part of Project EXPORT (Excellence in Partnerships for Community Outreach, Research on Disparities in Health, and

Training). Examination of these factors provided baseline information for the development of a campus health intervention. It also allowed us to engage the HBC students in the process of health assessment of their campus.

Less than half of the study participants met the recommended level of moderate or vigorous physical activity. This confirms the need for programs promoting PA at this campus. We found that the students participating in the survey had a largely positive outcome expectation for exercise and confidence to participate in PA. Over 50% of the students were at a stage of readiness that was receptive to messages promoting PA (contemplation and preparation) and were confident that they could set aside 30 minutes a day to exercise and exercise alone. Recent research by Blanchard et al²⁸ found that perceived behavioral control (ie, the perceived ease or difficulty of performing PA) was a significant predictor of PA among African American students. Blanchard et al²⁸ emphasize the need to consider ethnicity when utilizing theories of health behavior in program planning.

In addition to high readiness and confidence, the participants of our study had high expectations for exercise to have a positive impact on health, appearance, and stress management. High positive outcome expectations can be considered favorable for predicting adoption of PA, but some researchers warn that high expectations for positive health outcomes with PA could actually contribute to lower adherence rates. The idea of high positive expectations could reflect a “false hope” that if not realized could contribute to lower rates of PA.^{29,30} More research is needed to determine the predictive value of this factor on PA behavior among African American college students, but it should prompt programmers to be careful about “overselling” the benefits of PA.

Another useful finding of the study came from comparing participants who completed both the survey and pedometer phases the study to participants who only completed the survey. Those who participated in the pedometer portion of the study were less likely than “survey-only” participants to meet the moderate PA recommendations. We considered this a useful finding because it suggests that this type of physical activity program (ie, pedometers) attracted the type of student we most want to reach (those not meeting recommended activity levels) versus those who may already be sufficiently active. Though the pedometer study sample was small, we were able to gather some insights into this group. Pedometer study participation declined slowly over the 5 weeks of the study (approximately 7% per week), suggesting that these students were motivated. There was a small amount of variation in the weekly average of daily steps. A consistent percentage of participants (8.3% to 11.5%) achieved low levels of daily PA each week (ie, fewer than 5,000 steps per day) and the majority of participants never acceded 10,000 steps per day. These data provide consistent baseline of step levels from which program goals can be set. We feel that a pedometer intervention program could be well received by the segment of the student population that would most benefit from this type of motivational tool (ie, students not meeting moderate intensity PA recommendations). Although there are no national pedometer guidelines, the new 2008 Guidelines for Physical Activity do refer to pedometers as a useful tool to assist Americans in meeting their daily physical activity goals.³¹

In conclusion, this study supported the need for a physical activity promotion program for African American students of a southern HBC and provided information that would be considered in program design. We used 2 established measures to assess PA (BRFSS survey questions and pedometers). Data from both instruments indicated that the majority of students did not meet health-promoting levels of PA. Many questions still remain about the use of pedometers to assess PA and limitations should be acknowledged (eg, sensitivity to nonlinear movement, error associated with individual variation, or physical limitation, etc). Although there is well established data examining health outcomes and moderate and vigorous PA

measures,^{4,31} the appropriate recommendation of “steps per day” for health across populations remains to be determined. Current estimates of mean “steps per day” across populations include 7,000 to 13,000 for healthy young adults and 6,000 to 8,500 for healthy older adults.²⁶ The health implications of young healthy adults consistently achieving PA levels corresponding to less than 10,000 steps per day is not yet known.

This study provided valuable information about a large number of African American college students but there are some limitations. A major limitation of this study is the use of a convenience sample, which limits the representativeness of the data to the general African American college student population. In addition, though we assessed several important factors predictive of PA behavior, consideration of ethnicity-specific beliefs will be important in future research.

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TABLE 1

Descriptive Data for Participants

	Total	Males	Females
<i>N</i>	106	29	77
(% of total)	(100%)	(27.4%)	(72.6%)
Age (years)	20.9 ± 2.0	20.8 ± 2.3	20.9 ± 1.9
Freshmen	22.9%	27.6%	21.1%
Sophomore	35.2%	34.5%	35.5%
Junior	20.0%	24.1%	18.4%
Senior	21.0%	13.8%	23.7%
BMI (kg/m ²)	25.3 ± 4.9	25.1(± 4.0)	25.3(± 5.2)
“Underweight”	2.9%	0.0%	4.0%
“Normal weight”	53.8%	53.3%	55.2%
“Overweight”	25.0%	27.6%	24.0%
“Obese”	18.3%	17.2%	18.7%

TABLE 2

Stage of Change for Physical Activity

Stage of change	Total
Precontemplator	3.8%
Contemplator	20.8%
Preparation	32.1%
Action	17.9%
Maintenance	25.5%

TABLE 3 Positive Outcome Expectations for Physical Activity^a

Promote health	Very unlikely	Very likely
Benefit the health of my heart	4.8%	79.8%
Improve my overall health	0%	89.4%
Give me energy	8.6%	57.1%
Help me live long	3.8%	73.6%
Enhance appearance		
Help me in controlling weight and improving appearance	7.8%	75.5%
Help me get or keep in shape	2.9%	82.9%
Stress management/mental health		
Help me feel good about myself	4.9%	75.7%
Help me cope with stress and tension	15.7%	56.9%
Help me avoid feeling guilty	29.5%	40.0%
Result in having fun	3.8%	73.6%

^aHow likely would the following occur if you were to be physically active on a regular basis during the next 3 months?

TABLE 4 Negative Outcome Expectations for Physical Activity^a

	Very unlikely	Very likely
Lead to my getting injured	67.3%	8.5%
Cause me pain and muscle soreness	23.3%	34.0%
Result in my overexerting myself	40.4%	17.3%
Make me tired	27.4%	29.2%
Result in my being embarrassed	69.2%	12.5%
Interfer with my other responsibilities	48.6%	15.1%
Involve a lot of getting ready and cleaning up	23.3%	33.0%

^aHow likely would the following occur if you were to be physically active on a regular basis during the next 3 months?

TABLE 5**Self-Efficacy (Confidence) to Exercise^a**

	High	Low
Stick with an exercise program even when your family is demanding more time from you.	41.4%	17.9%
Exercise even though you are feeling sad or very stressed	50.0%	18.9%
Set aside time for physical activity program, such as walking, jogging, swimming, biking, or other continuous activities for at least 30 minutes on most days of the week	52.4%	21.0%
Stick with an exercise program if you have to exercise on your own	65.1%	12.3%
Get up early to exercise	38.7%	33.3%
Stick with exercise even though you have excessive demands at school or work	33.3%	33.3%
Stick with exercise program after a long tiring day at school or work	34.0%	31.1%
Read or study less in order to exercise more	14.1%	65.1%

^aHow confident are you to motivate yourself to do the following over the next 3 months?

TABLE 6

Participants' Levels of Moderate and Vigorous Physical Activity

	Total
Meet VPA recommendations	42.5%
Inadequate levels of VPA	21.7%
No VPA	35.8%
Meet MPA recommendations	29.2%
Inadequate levels of MPA	48.2%
No MPA	22.6%

Note. VPA = vigorous physical activity; MPA = moderate physical activity.

TABLE 7

Daily Step Averages and Percent Achieving Low or High Step Levels

	Mean	(SD)	Low^a	High^a
Week 1 (<i>n</i> = 32)	8707.2	(± 3,571.3)	9.4%	27.9%
Week 2 (<i>n</i> = 29)	8872.1	(± 2,786.3)	10.3%	31.0%
Week 3 (<i>n</i> = 28)	8740.3	(± 3631.8)	10.7%	17.9%
Week 4 (<i>n</i> = 26)	8031.3	(± 2676.2)	11.5%	15.5%
Week 5 (<i>n</i> = 24)	8827.02	(± 2873.1)	8.3%	41.7%

^aDaily step average < 5,000.^bDaily step average > 10,000.

TABLE 8

Comparison of Pedometer Participants and Survey Only Participants

	Survey only participants <i>n</i> = 77	Survey and pedometer participants <i>n</i> = 29
Gender		
Male	29.7%	21.9%
Female	70.3%	78.1%
Age	21.0 ± 2.04	20.6 ± 1.84
BMI (kg/m ²)	25.1 ± 5.19	25.7 ± 4.25
Meet MPA recommendations	36.5%	12.5% ^a
Meet VPA recommendations	45.9%	34.4%
Stage of change		
Precontemplation	4.1%	3.1%
Contemplation	21.6%	18.8%
Preparation	32.4%	31.3%
Action	16.2%	21.9%
Maintenance	25.7%	25.0%

^a
p = .01.