

# RACIAL DIFFERENCES IN PHYSICAL ACTIVITY ASSOCIATIONS AMONG PRIMARY CARE PATIENTS

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**Objectives:** To examine the contributions of self-efficacy, outcome expectations, barriers, and demographic/health factors to physical activity behavior in primary care outpatients and to determine differences in these associations for African American versus Caucasian patients.

**Design:** Cross-sectional, structured interview.

**Participants and Setting:** Adult internal medicine outpatients ( $n=393$ , response rate 88.5%) were enrolled. Most were female (70%) and Caucasian (62%) with a yearly household income  $< \$20,000$  (54%) and history of arthritis (57%). Mean age was  $48.9 \pm 11.8$  years and BMI was  $30.9 \pm 8.16$  kg/m<sup>2</sup>.

**Measurements:** A 30-minute structured interview assessed self-reported leisure-time physical activity, self-efficacy, outcome expectations, perceived barriers, and demographic/health covariates.

**Results:** Based on path analysis, social cognitive constructs accounted for 28% of the variance in physical activity in African American patients and 25% in Caucasian patients. After controlling for selected covariates, path analysis showed a direct association between self-efficacy and physical activity for African American ( $\beta=.45$ ,  $P<.01$ ) and Caucasian patients ( $\beta=.34$ ,  $P<.01$ ). Although higher self-efficacy was associated with higher outcome expectations for both groups ( $\beta=.25$ ,  $P<.05$ ,  $\beta=.21$ ,  $P<.05$ , respectively), no direct association was found for outcome expectations with activity. Self-efficacy demonstrated an indirect association with activity through perceived barriers for Caucasian patients only.

**Conclusions:** Self-efficacy and perceived barriers were the most important independent correlates of physical activity with potential racial differences warranting further study noted. (*Ethn Dis.* 2007;17:629–635)

**Key Words:** Exercise, Social Cognitive, Ethnicity

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## INTRODUCTION

Physical inactivity is a major public health problem, especially among minority and lower socioeconomic status (SES) populations.<sup>1–4</sup> This is especially concerning because higher death rates from chronic disease among minority populations may be explained in part by reduced SES and more frequent disease risk factors.<sup>5</sup> Although health disparities among racial/ethnic populations appear multifactorial,<sup>6</sup> improving physical activity may reduce such disparities.

The primary care setting is a worthwhile and effective setting for providing exercise counseling, and the Healthy People 2010 objectives include enhancing physician exercise counseling.<sup>7–9</sup> More than 400 million outpatient visits to a primary care physician occur in the United States annually,<sup>10</sup> and the morbidity and mortality related to three of the leading illness-related reasons for these visits (hypertension, arthritis, and diabetes) are likely to be attenuated by regular exercise.<sup>2,10</sup> Unfortunately, most patients seen in primary care settings are not regularly active,<sup>11,12</sup> and healthcare provider advice about physical activity among minority primary care populations remains inadequate.<sup>13</sup>

Physical activity interventions to enhance activity levels are most effective when they are based on the physical activity correlates specific to the population of interest.<sup>14</sup> Further study is needed to determine the unique activity corre-

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lates among minority populations because prior studies have indicated inconsistent results as to whether racial differences exist and have rarely examined the role played by social cognitive constructs other than self-efficacy.<sup>15–21</sup> It is important to also focus on the primary care population, because a diagnosis of chronic disease rarely occurs in isolation,<sup>22,23</sup> and most prior studies have evaluated correlates in populations with a single chronic disease.<sup>24–28</sup> Furthermore, the primary care population differs from the general population, as evidenced by a higher prevalence of exercise barriers<sup>29</sup> such as pain, fear of falling, lower extremity swelling, and fatigue.<sup>30,31</sup> The high prevalence of physical inactivity is especially important to address among minority primary care patients of lower SES who are at increased risk of chronic disease morbidity and mortality related to inactivity.<sup>5,32</sup> In spite of its importance, few studies have focused exclusively on a primary care population with adequate minority and lower SES representation.<sup>11,30</sup>

Bandura's social cognitive theory is a useful framework for understanding

and promoting physical activity in healthy and chronic disease populations.<sup>26,33,34</sup> Self-efficacy, the key construct within the theory, is defined as the belief that an individual has for being able to successfully complete a course of action and has typically been assessed in the physical activity literature as confidence to overcome barriers to behavior performance (ie, barrier or coping self-efficacy) or confidence to perform the constituent components of the task (ie, task self-efficacy).<sup>33,35</sup> Task self-efficacy may be of particular importance in chronic disease populations,<sup>28,36</sup> suggesting the need to assess both barrier and task-related aspects. Although self-efficacy has been consistently associated with physical activity, it is often studied without consideration of other social cognitive theory constructs that may influence behavior.<sup>37</sup> Such constructs include perceived barriers or facilitators and outcome expectations (eg, expected exercise benefits).<sup>4,37-39</sup> From a social cognitive perspective, self-efficacy is theorized to have the strongest and most consistent influence on behavior but can also have indirect effects on behavior through its influence on outcome expectations and perception of barriers.<sup>40</sup>

Because few studies have focused on a primary care population with adequate minority and lower SES representation, the objective of the present study was to examine the contributions of self-efficacy, outcome expectations, barriers, and demographic/health factors to physical activity behavior in a sample of lower SES primary care outpatients. An additional objective was to determine differences in these associations for African American versus Caucasian patients.

## METHODS

### Participants, Setting, and Survey Administration

This cross-sectional study enrolled 393 adult patients followed in an Internal Medicine resident physician

continuity of care clinic at a southeastern US medical school. Institutional review board approval was obtained, and participants completed an informed consent prior to data collection. No monetary or other incentive was provided for participation. Acutely ill patients were excluded along with patients unable to communicate in English and/or possessing a diagnosis that would interfere with accurately answering the study questions (eg, psychosis, dementia). Eligibility was determined based on a predetermined checklist completed by the research assistant in collaboration with the clinic staff. Study participation was offered by the research assistant, and the survey was completed before the participant began their physician visit. A small percentage (12%) completed the survey after the physician visit to prevent interruption of clinic flow. The survey was administered by the trained research assistant as a 30-minute structured interview. To ensure consistent administration of the interview to all participants, the same research assistant administered all interviews. Data were collected from September 1996 through August 1998, with 393 out of 444 potentially eligible patients participating (response rate 88.5%).

### Measures

Physical activity was assessed with items adapted from the CARDIA physical activity history (reliability of  $r=0.81$ ),<sup>41,42</sup> which has proven useful in the measurement of activity patterns among low-income minority populations.<sup>43</sup> Participants were asked to recall the number of hours per week "on average, during the past 12 months" that they participated in 24 separate types of exercise (eg, jogging, dancing, walking, bowling). Based on Ainsworth's compendium of physical activity,<sup>44</sup> a metabolic equivalent (MET) value was assigned to each exercise classification, and MET times hours per week (MET\*hours/week) was cal-

culated. The total leisure activity score was then calculated by summing the MET\*hours/week for each moderate and vigorous leisure-time exercise type (MET value  $\geq 3.0$ ).

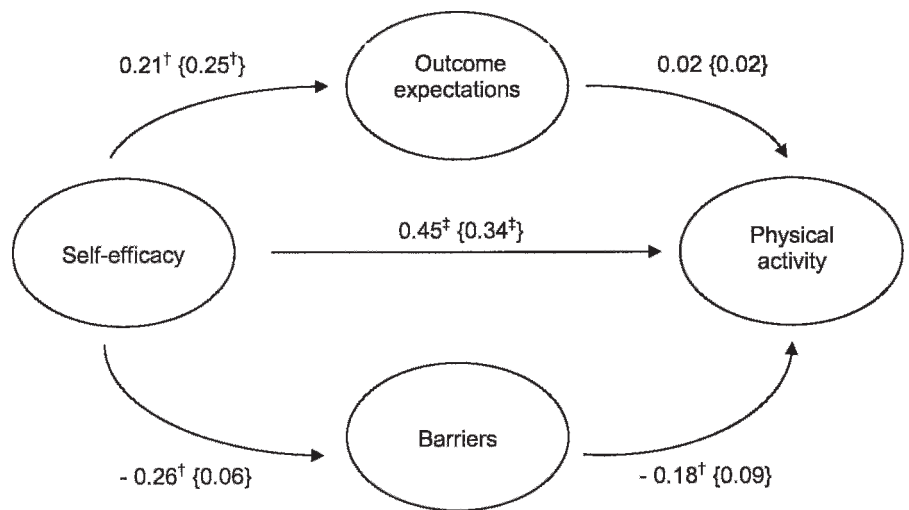
Task self-efficacy was measured using a four-item scale with a test-retest reliability of .89 and strong associations with physical activity in other chronic disease populations.<sup>45,46</sup> Participants were asked to rate confidence in their ability to walk 20 minutes without stopping, run for 10 minutes without stopping, climb three flights of stairs without stopping, or exercise for 20 minutes at a level hard enough to cause a large increase in heart rate and breathing. Barrier (or coping) self-efficacy was measured using a three-item scale with a test-retest reliability of .92 and positive associations with activity in prior studies.<sup>47</sup> The items asked participants to rate confidence in their ability to set aside time to exercise, exercise when feeling sad/highly stressed, and exercise when family/social life takes a lot of time.<sup>48</sup> Cronbach's alpha in our study population was .86 for task self-efficacy and .78 for barrier self-efficacy. Both self-efficacy measures used a five-point Likert scale (1 = I'm sure I cannot to 5 = I'm sure I can).

Outcome expectations were measured with a scale developed for a low-income minority population in the Physical Activity for Risk Reduction (PARR) study.<sup>48</sup> The outcome expectation scale has demonstrated a test-retest reliability of  $>80\%$ <sup>47</sup> and significant associations with physical activity.<sup>49</sup> Participants rated agreement on a five-point Likert scale (1 = strongly disagree to 5 = strongly agree) according to the statement that exercise would provide each of the following benefits: less depression, improve self-esteem, meet new people, lose weight/improve shape, build muscle strength, less stress, improve health/reduce risk of disease, feel more attractive, and improve heart and lungs. Although the PARR scale included job improvement as a potential

benefit, this was not included in our study due to frequent unemployment. Responses were summed for an outcome expectations score. Cronbach's  $\alpha$  in our sample was .81.

Physical activity barriers were measured utilizing the PARR scale<sup>48</sup> previously demonstrating a test-retest reliability of >80%<sup>47</sup> and significant associations with physical activity.<sup>49</sup> Participants were asked how often 18 different barriers "interfered with getting exercise" with a five-point Likert scale (1 = never to 5 = very often). Four items (pain, cost, lack of transportation, lack of family support) were added to 14 PARR scale items (embarrassment; not knowing how; fear of injury; weather; bad health; discouragement; and lack of interest, self-discipline, time, company, enjoyment, equipment, skills, or facilities). Responses were summed for the perceived barriers score and the Cronbach's alpha for our study sample was .77.

Covariates were self-reported. Demographics included birth date, race, sex, and annual household income. Health-related variables included arthritis (yes/no), height, and weight. Body mass index (BMI) was calculated by dividing weight (kilograms) by height (meters squared). Because symptomatic (rather than asymptomatic) arthritis is expected to influence activity levels and medical record documentation of this diagnosis is often omitted, self-reported arthritis (as opposed to physician or radiographic diagnosis) was used. A medical chart review carried out by the trained research assistant on a convenience sample of participants identified chronic disease diagnoses. Because the chart review was not completed for all participants due to chart availability and project funding, these data were used to describe the distribution of chronic disease history in the study sample but were not used in any analyses. Nevertheless, symptomatic (or self-reported) arthritis would be the most important condition to assess because of its high prevalence and known negative



**Figure 1.** Path coefficients\* among primary care patients for relationships among physical activity, self-efficacy, barriers, and outcome expectations adjusting for gender, age, income, body mass index, and arthritis and stratified by race {total R squared=0.25 for Caucasian (outside brackets) and 0.28 for African-American (inside brackets)}.

\*Caucasian outside brackets; African-American inside brackets.

† $P < .05$ .

‡ $P < .01$ .

association with reduced activity levels.<sup>50</sup> Participants with a chart review did not differ from those without the review with regard to age, sex, race, level of education, physical activity level, income, or BMI.

### Data Management and Analysis

Data were analyzed with SPSS 14.0 and Mplus 3.11.<sup>51</sup> Given that all continuous variables, with the exception of BMI, were non-normally distributed, these variables were log transformed before subsequent analyses. Initial bivariate associations were examined with Pearson product-moment correlation coefficients. The primary outcome (dependent variable) was total leisure-time activity (MET\*hours/week). The independent variables included self-efficacy, outcome expectations, and perceived barriers. After stratification by race, the following covariates were considered: sex, age, income, BMI, and self-reported diagnosis of arthritis.

To test the hypothesized social cognitive model (Figure 1), we used path analysis within a covariance mod-

eling framework using the full-information maximum likelihood (FIML) estimator in Mplus 3.11.<sup>51</sup> As is shown in Figure 1, the model tested specified: 1) direct effects of self-efficacy on barriers, outcome expectations, and physical activity; 2) an indirect path of self-efficacy on physical activity through outcome expectations and barriers; and 3) direct effects of barriers and outcome expectations on physical activity. To determine whether the nature of these associations differ for African American versus Caucasian patients, we tested the proposed relations separately in each group. Additionally, we included those demographic and health-related variables that have been previously associated with model constructs as covariates.

Model-data fit was assessed using a number of standard structural equation modeling fit indices including the chi-square statistic, root mean square error of approximation (RMSEA), standardized root mean square residual (SRMR), and comparative fit index (CFI). The chi-square statistic assessed absolute fit of the

**Table 1. Participant characteristics**

Characteristic	Number of Respondents (%)* or Mean ± SD
Sex	
Men	117 (30%)
Women	276 (70%)
Age (years)	48.9±11.8
Race	
African American	150 (38%)
Caucasian	243 (62%)
Yearly income (US\$)	
<5,000	82 (21%)
5,000–9,999	132 (33%)
10,000–14,999	70 (18%)
15,000–19,999	34 (9%)
20,000–34,999	22 (6%)
≥35,000	20 (5%)
Refused to report	34 (8%)
Arthritis	
Yes	223 (57%)
No	170 (43%)
Body mass index (kg/m <sup>2</sup> )	30.9±8.16
Number of co-morbidities	2.2±1.5

\* Some subcategories have missing values. SD = standard deviation.

model to the data,<sup>52</sup> and a non-significant chi-square is indicative of a good fit. However, this statistic is sensitive to sample size. A value ≤.08 or less for the SRMR is considered to represent a good fitting model.<sup>53</sup> Values ≤.06 and >.95 for the RMSEA and CFI, respectively, are indicative of a good fitting model.<sup>53</sup> Significant path coefficients are based on a one-tailed test.

## RESULTS

### Participants' Characteristics

Most participants were female (70%) and Caucasian (62%) with a yearly household income <\$10,000 (54%) and a history of arthritis (57%) (Table 1). Mean age was 48.9±11.8 years, and mean BMI was 30.9±8.16 kg/m<sup>2</sup>. Medical chart review information available on a convenience sample of 225 of the 393 participants revealed a mean number of co-morbidities of 2.2±1.5; the most prevalent chronic diseases in addition to arthritis were hypertension (49%), diabetes (28%),

depression (25%), and hypercholesterolemia (21%). African-American patients did not differ from Caucasian patients with regard to sex, age, yearly income, diagnosis of arthritis, or number of co-morbidities. BMI was slightly higher among African American when compared with Caucasian patients (mean = 32.4±8.8 kg/m<sup>2</sup> vs 30.1±7.7 kg/m<sup>2</sup>, *P*=.009).

With regard to leisure-time physical activity, mean MET\*hours/week was 22.4±37.8. No activity was reported by 22%, and 48% reported <10 MET\*hours/week (less than the equivalent of 150 minutes of walking per week).<sup>2</sup> The most popular activity was walking (structured or integrated into other activities such as hunting) (mean weekly hours=2.2) followed by non-strenuous sports such as shooting baskets or fishing (mean weekly hours=.7) and non-vigorous home exercises or calisthenics (mean weekly hours=.7). On a possible scale of 1 to 5, mean self-efficacy was 2.4±1.4 for task (i.e., “not sure” to “maybe confident”) and 3.7±1.1 for barrier (“maybe” to “def-

initely confident”). Within a possible range of 9 to 45, the mean outcome expectations score was 38.0±5.8. Within a possible range of 18 to 90, the mean perceived barriers score was 33.3±9.9.

### Physical Activity Correlates

Bivariate Pearson correlations are shown in Table 2. As barrier self-efficacy was not associated with any of the key constructs, it was eliminated from subsequent analyses. Patients reporting greater physical activity were more likely to be younger, male, and free of arthritis. Moreover, those who were more physically active reported fewer barriers and higher task self-efficacy and annual income. Participants expecting greater exercise benefits were more likely to be female and reported higher self-efficacy, BMI, and annual income. Participants who reported fewer activity barriers were more likely to be African-American, male, and older while reporting greater self-efficacy and lower BMI. More self-efficacious participants were younger, more likely to have higher incomes, and more likely to be male and less likely to have arthritis or high BMI.

### Path Analysis of a Social Cognitive Model of Physical Activity in Caucasians

The hypothesized path model shown in Figure 1 accounted for 23.5% of the variation in physical activity and represented a good fit to the data for Caucasian participants ( $\chi^2 = 2.78$ , *df* = 1, SRMR = .01, RMSEA = .07, CFI = .99). As can be seen in Figure 1, after controlling for all covariates, the model accounted for 25% of the variance in activity with task self-efficacy being significantly associated with outcome expectations ( $\beta = .21$ , *P* < .05), barriers to physical activity ( $\beta = -.26$ , *P* < .05), and physical activity ( $\beta = .45$ , *P* < .01) among Caucasians. That is, more efficacious Caucasian participants had more positive

**Table 2. Pearson correlations for physical activity, social cognitive theory constructs, and covariates**

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Physical activity		.06	-.13*	.46**	-.03	-.12*	-.24**	.16**	-.04	.11*
2. Outcome expectations			.09	.17**	.00	.12*	.01	.13*	.14**	.00
3. Barriers				-.14**	.20**	.14**	-.14**	-.06	.25**	-.08
4. Self-efficacy					-.02	-.14**	-.33**	.32**	-.20**	.24**
5. Race†						-.01	.07	.07	-.14**	-.09
6. Sex§							.09	-.23**	.20**	-.13*
7. Age								-.25**	.05	-.38**
8. Income									-.12*	.20**
9. Body mass index										-.15**
10. Arthritis¶										

\*  $P < .05$ \*\*  $P < .01$ 

† 1=African-American, 2=not African-American

§ 1=male, 2=female

¶ 1=diagnosis of arthritis, 2=no diagnosis of arthritis

outcome expectations, perceived fewer barriers to activity, and were more physically active. Additionally, those who reported fewer barriers were significantly more active ( $\beta = -.18, P < .05$ ). Caucasians who had higher levels of task self-efficacy were also younger ( $\beta = -.28, P < .05$ ), had higher incomes ( $\beta = .24, P < .05$ ), and lower BMI ( $\beta = -.15, P < .05$ ). Older individuals ( $\beta = .31, P < .01$ ) with higher BMI ( $\beta = .21, P < .05$ ) also perceived more barriers to being active. Having higher outcome expectations was also associated with having higher income ( $\beta = .18, P < .05$ ) and being female ( $\beta = .18, P < .05$ ). Finally, Caucasian adults with greater BMI reported significantly less physical activity ( $\beta = -.12, P < .01$ ).

### Path Analysis of a Social Cognitive Model of Physical Activity in African Americans

The hypothesized path model shown in Figure 1 accounted for 22% of the variation in physical activity but did not represent a particularly good fit to the data for African American participants ( $\chi^2 = 3.33, df = 1, SRMR = .04, RMSEA = .12, CFI = .94$ ). However, including all covariates in the model improved the fit ( $\chi^2 = .39, df = 1, SRMR = .01, RMSEA = .0, CFI = 1.0$ ) and accounted for a total of 28% of the variance in activity. As can be seen

in Figure 1, after controlling for all covariates, self-efficacy was significantly associated with outcome expectations ( $\beta = .25, P < .05$ ) and physical activity ( $\beta = .34, P < .01$ ) among African Americans. More efficacious individuals had more positive outcome expectations and were more physically active. Neither barriers nor outcome expectations were associated with being more active.

Among African American participants, more efficacious adults tended to be younger ( $\beta = -.23, P < .05$ ), have higher income ( $\beta = .25, P < .05$ ), and lower BMI ( $\beta = -.17, P < .05$ ). Individuals with higher BMI also perceived more barriers to being active ( $\beta = .31, P < .01$ ) and had higher outcome expectations ( $\beta = .34, P < .01$ ). Finally, older African American adults reported significantly less physical activity ( $\beta = -.23, P < .01$ ).

## DISCUSSION

The study objective was to provide a better understanding of how social cognitive constructs are associated with physical activity behavior in African American vs Caucasian primary care outpatients. Task self-efficacy demonstrated both a direct association with physical activity and an indirect association through perception of barriers. Although

this pattern of relationships was not completely reproduced in the African American patients, a significant direct association for self-efficacy with physical activity remained. Among the covariates, only age (among African-American patients) and BMI (among Caucasian patients) remained important physical activity correlates after adjustment for social cognitive theory constructs.

Although prior studies have demonstrated racial and ethnic differences in physical activity correlates and barriers,<sup>15,16,18-21</sup> few have examined the role played by social cognitive constructs other than self-efficacy, especially in African-American adults. The differential pattern of relationships between social cognitive factors and physical activity for Caucasians and African Americans suggests that the relative importance of these constructs may vary by race and are likely moderated by other factors including demographics and medical co-morbidity. Further examination of such a proposition is warranted.

It is clinically important to confirm the utility of the social cognitive theory in understanding physical activity behavior in an under-served, understudied, primary care population. Demonstrating an independent and moderate association between self-efficacy and physical activity compared to a minimal

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*Our results suggest potential racial differences in social cognitive correlates of physical activity...*

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(perceived barriers) or no association (outcome expectations) for other social cognitive theory variables is consistent with Bandura's position that in situations where self-efficacy is predictive of behavior, outcome expectations are unlikely to serve any further predictive utility.<sup>33</sup> Alternatively, the lack of association with outcome expectations may be partially explained by the fact that the expectation of benefit from exercise was very high in the study population (only 5% reported a score less than mid-range), reducing the variability of the score and ability to discriminate differing activity levels.

Our results suggest potential racial differences in social cognitive correlates of physical activity, but these differences need to be replicated with prospective and randomized controlled designs and with objective measures of physical activity. Also, prior interventions in the primary care setting have focused on barrier self-efficacy as an important mediator to exercise adherence post-intervention,<sup>54</sup> but the task aspect of self-efficacy warrants further attention. Task self-efficacy can be positively altered by an exercise program,<sup>28,55</sup> but intervention studies are needed to confirm if improving task self-efficacy among primary care patients is possible and whether this increase will mediate greater exercise adherence.

Our study is strengthened by its large sample size, which allows contemporary statistical methods to examine racial differences in the complex relationships among social cognitive theory constructs and physical activity. Importantly, this study tested the utility of multiple social cognitive constructs as

correlates of physical activity, rather than self-efficacy alone. Furthermore, we target an understudied population in the physical activity literature, low-income, African American and Caucasian primary care patients. However, our study generalizability is limited by the single site primary care setting, and causal statements are prohibited by its cross-sectional design. Nevertheless, the direction of the proposed relationships is theoretically plausible, and subsequent prospective studies considering more complete representations of social cognitive constructs and those health and demographic factors that might moderate their influence on physical activity are warranted.

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