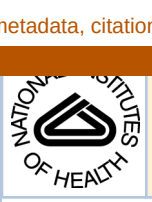

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Exercise Adoption among Older, Low-Income Women at Risk for Cardiovascular Disease

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Abstract

Objective—Using an expanded Social Cognitive Theory (SCT) model, we hypothesized that self-efficacy, outcome expectations, and exercise self-definition would predict exercise adoption.

Design—This secondary analysis examined data from a prospective single-group study of low-income women who received a physician screen and referral to a community-based, free exercise program.

Sample—The sample included 190 older, low-income women with a mean age of 64 years, the majority of whom were African American (66%) and had at least one cardiovascular risk factor (92%).

Measures—Baseline values of self-efficacy, outcome expectations, and exercise self-definition were measured using instruments developed for the study. Exercise adoption was defined as the number of exercise sessions completed over 8 weeks. Our hypothesis was tested using hierarchical multiple regression.

Results—The mean number of exercise sessions completed over the 8-week period was 5.7 out of a recommended 24. Value of Exercise scores, a subscale of the Exercise Self-Definition scale, predicted exercise adoption. Self-efficacy and outcome expectations were not predictive.

Conclusions—The significance of Value of Exercise scores reinforces the importance of expanding SCT with additional variables such as exercise self-definition. Future work should emphasize the social and environmental factors that form an important part of SCT.

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Keywords

exercise adoption; Social Cognitive Theory; exercise self-definition; women

Women who are older, African American, or of lower socioeconomic status are at an increased risk of cardiovascular disease and type 2 diabetes (Forouhi & Sattar, 2006). Regular exercise has been shown to manage, delay the onset of, and even prevent these chronic diseases (Nelson et al., 2007). Unfortunately, these same women report the lowest levels of exercise participation (Centers for Disease Control and Prevention [CDC], 2005, 2007). Even minor increases in levels of exercise can lead to significant health benefits, particularly among the least physically active (Brown, Burton, & Rowan, 2007; Church, Earnest, Skinner, & Blair, 2007; Gillies et al., 2007). Increasing physical activity among these women is a public health priority. Therefore, development and expansion of conceptual approaches to broaden our understanding of the factors that influence exercise adoption are important.

According to Social Cognitive Theory (SCT; Bandura, 1997), if people are to change personal behaviors, they must believe they are capable of performing the behaviors (self-efficacy) and that rewards, or benefits, are associated with such performance (outcome expectations). Unless people believe their actions lead to desired outcomes, they are not motivated to act or to keep trying when faced with difficult situations (Bandura, 2004).

Self-efficacy has been used extensively to explain exercise behavior and guide intervention development. Stronger self-efficacy is associated with more exercise (Cox, Gorely, Puddey, Burke, & Beilin, 2003; McAuley & Blissmer, 2000; Resnick, 2001). Although studied to a lesser degree, self-efficacy has also been positively related to exercise behaviors among older, African American, and low-income women (Ainsworth, Wilcox, Thompson, Richter, & Henderson, 2003; Annesi, 2007; Lee & Cloutier, 2006). Outcome expectations are also positively related to exercise, particularly among older adults (Conn, Burks, Pomeroy, Ulbrich & Cochran, 2003; Dye & Wilcox, 2006; Resnick, 2004).

A review of this literature revealed limitations of previous studies such as an over-reliance on cross-sectional research designs; samples limited to mostly white, motivated, and healthy volunteers with moderate income levels; and an almost exclusive use of self-reported measures of exercise. Furthermore, the proportion of the variance in exercise explained by self-efficacy and outcome expectations remains small and at times clinically insignificant, suggesting the need for the continued development and expansion of conceptual models to explain exercise participation (King, Stokols, Talen, Brassington, & Killingsworth, 2002).

One potentially important but relatively understudied area of exercise behavior involves the study of exercise self-definitions and how having an exercise identity relates to exercise participation. According to Bandura (1997), a basic source of motivation to behavioral change is whether performing the required behaviors is congruent with how we define ourselves (Bandura, 1997). That is, does performing the key behaviors promote self-satisfaction and a sense of worth? Are the behaviors consistent with personal values and goals? Theories of the self, including the self-schema model (Markus, 1977), self-perception theory (Bem, 1972), and identity theory (Stryker, 1987), propose that self-definitions influence the way we think about our potential, guide our motivation and behavior, and are shaped by personal experiences in situations over time. We behave in ways that are consistent with our self-views; that behavior, in turn, reinforces self-definitions, which in turn promote the continued behavior.

Kendzierski (19888) adapted Markus' work on self-schemata and applied it to the study of self-definition and exercise. Young adults who define themselves as exercisers exercise more frequently, use more strategies to help themselves exercise regularly, and have higher expectations for future exercise (Kendzierski, 1988, 1994; Miller, Ogletree, & Welshimer, 2002; Yin & Boyd, 2000). In preliminary analyses of the current study data, exercise self-definition was correlated with exercise adoption ($p < .01$; Hays, Damush, & Clark, 2002), prompting us to examine its relationship to exercise adoption within SCT.

Conceptually, Markus' self-definitional approach and Kendzierski's work on the relationship between exercise self-definition and exercise participation are consistent with the tenets of SCT. Bandura (1997) proposed that through transactional experiences a structured self-system, including how one defines oneself, evolves and that these self-definitions influence future behavior. The recursive nature of self-definitions and behavior is similar to the mutual influence of self-efficacy and behavior change (Kearney & O'Sullivan, 2003). However, Bandura would maintain that self-efficacy has a greater influence on future behavior than self-definition.

Hypothesis

Based on the foregoing, we proposed that women would be more likely to adopt an exercise program if they were confident they could perform the exercise, believed that exercising would lead to positive outcomes, such as improved health, and defined themselves as exercisers. The purpose of this study was to test whether variables in a model based on Social Cognitive Theory (SCT; Bandura, 1997) and expanded with a self-definitional approach (Kendzierski, 1988; Markus, 1977) would predict exercise adoption. This study strengthens knowledge in this area by using a prospective design, measuring exercise participation objectively, and targeting an understudied population that is physically inactive and at high risk for cardiovascular complications. We hypothesized that self-efficacy, outcome expectations, and exercise self-definition would predict the adoption of a community-based group exercise program by older, mostly African American women of low socioeconomic background (Figure 1).

Method

Design and Sample

This study was a secondary analysis of data from a prospective single-group study that evaluated the long-term effectiveness of physician-initiated exercise referral among women attending urban primary care clinics (Clark, Stump, & Damush, 2003; Damush, Stump, Saporito, & Clark, 2001). Data were extracted from a baseline survey and exercise class attendance records. The local Institutional Review Board approved both the original study and the current study.

Women aged 50 years or older who received health care from one of two community health centers (A or B) were identified by the medical record system. These health centers serve predominantly low-income adults, the majority of whom are African American. Fewer than 10% of those registered in the medical record system meet current recommendations for physical activity. In addition, these patients are 4 times more likely to be poor, 2 to 3 times more likely to report fair or poor health, and more likely to have a medical diagnosis of hypertension, type 2 diabetes, or coronary heart disease than the general population of US adults (Clark, 1999).

Patients were considered eligible for the study if they were female, aged 50 years or older, not terminally ill, and had visited either of the two study health centers within 12 months prior to the start of the study. Of 860 eligible women identified, 500 visited the clinics

during the 6-month enrollment period. Of the 500 women seen, 404 (81%) were referred for exercise testing 124 (65%) scheduled an appointment for the test, and 100 (53%) completed the test). Of the 404 women referred for exercise testing, 190 (46%) completed the baseline survey (100 could not be reached by phone, 84 declined to be interviewed, and 30 were excluded from the study because of incomplete data) and comprised the sample for the current study.

Participants ranged in age from 50 to 88 years with a mean of 64 (SD = 8.32) years. The majority of the women were African American (62%) and were recruited from Health Center A (63%). Rates of chronic disease were high: 92% had hypertension, 43% had type 2 diabetes, 18% had coronary artery disease, 13% had previously suffered a stroke, and 12% had chronic obstructive pulmonary disease.

In the original study, all women aged 50 years or older who visited their physician during the six-month enrollment period were screened for study eligibility by their physician. This screening consisted of a brief discussion of the importance of exercise, a description of the study's exercise program, as well as the determination of each woman's eligibility to undergo exercise testing, a requirement for program participation. The women were contacted by research assistants to obtain verbal consent; complete a 20-minute baseline telephone survey on current exercise, health status, and sociocognitive variables; and schedule an appointment for the exercise test. Exercise testing was conducted in the clinics by a certified exercise physiologist and was free of charge. All women who participated in exercise testing successfully completed the test.

The exercise program was free of charge and held in local, safe, climate-controlled community buildings (a church and a community center). The same exercise physiologist led daily classes that consisted of 20 minutes of chair-based arm and leg movements, 20 minutes of resistance exercises using elastic bands, followed by 30 minutes of indoor walking. Women were encouraged to attend at least three sessions per week.

Measures

Self-efficacy and outcome expectations—Self-efficacy was measured using 3 items that assessed confidence in one's ability to perform the exercises specific to the study. Outcome expectations were measured using 3 items that assessed beliefs that such exercises would positively affect their health. (Damush, Stump, Saporito, & Clark, 2001). Responses ranged from 0 (*not at all*) to 10 (*very sure*), with a possible range of 0 to 30 for total scores. Cronbach alphas obtained in the current study were .75 for self-efficacy and .88 for outcome expectations.

Exercise self-definitions—The Exercise Self-Definition scale was developed for this study to measure the strength of each participant's perception of herself as an exerciser (Hays, Damush, & Clark, 2005). Higher scores reflect a stronger exercise self-definition. This multidimensional scale consists of three subscales: Social Acknowledgment, which refers to an individual's view of herself as an exerciser as well as her perception of whether others view her as an exerciser; Value of Exercise, which pertains to the perceived enjoyment and importance of exercising; and Competence, which measures one's perceived ability to perform specific exercises in comparison to others of the same age. Response categories for each item range from 0 (*not at all*) to 10 (*very sure*), with the range of subscale scores being 0 to 40 for Social Acknowledgment and Value of Exercise and 0 to 30 for Competence. Cronbach alpha coefficients for the subscales in this study were .86 for Social Acknowledgment, .88 for Value of Exercise, and .72 for Competence

Perceived health, mobility difficulty, and current exercise—Previous research examining predictors of exercise adoption has found that certain sociodemographic (i.e., age and race) and health status (i.e., perceived health, mobility difficulty, and current exercise participation) variables are related to exercise participation (Brawley, Rejeski, & King, 2003; Brownson et al, 2000; Clark, 1999). Therefore, these variables were statistically controlled in the regression analyses.

Each participant rated her overall health on a scale from *poor* to *excellent*. Self-reported difficulty with physical mobility was assessed using four items respectively asking whether participants had difficulty walking 1 block, walking 10 blocks, climbing 1 flight of stairs, and climbing several flights of stairs. Possible scores ranged from 0 to 4 with a higher score indicating greater perceived difficulty with mobility. Current exercise was defined as the self-reported number of minutes walked per week at baseline. Participants were asked whether they ever walked as far as one block and, if so, to describe the frequency and duration of such walks. Total minutes walked per week were calculated from these responses.

Exercise adoption—Exercise adoption was defined as the number of exercise sessions completed over 8 weeks. This time period was selected on the premise that the adoption of a new behavior corresponds to *initial* attempts to change existing behavior. The time frame was calculated from the date of the first exercise session completed for each participating woman. The exercise instructor recorded attendance.

Analytic Strategy

Our hypothesis was tested using hierarchical multiple regression analyses to assess whether the independent variables, self-efficacy, outcome expectations, and exercise self-definition predicted exercise adoption while controlling for the effects of sociodemographic and health status variables. The set of sociodemographic variables (age, race, and recruitment site) were entered in the first block, while the set of health status variables (perceived health, mobility difficulty, and current exercise) were entered in the second block. Finally, the set of sociocognitive variables (self-efficacy, outcome expectations, and exercise self-definition subscale scores) were entered in the third block.

Prior to analyses, continuous variables were examined for normality. Due to the large number (n = 106) of participants who completed no exercise sessions, the dependent variable, the number of exercise sessions completed over 8 weeks was positively skewed. To address this issue, we conducted two analyses in addition to the hierarchical multiple regression model described above. First, the skewed data were transformed to create a more normal distribution. However, the results of the multiple regression analysis using the newly transformed values did not differ from those obtained using the non-transformed values. Secondly. we restricted the multiple regression analysis to only those participants who completed at least one exercise session, which greatly reduced our sample from 190 to 84 participants. Again, results obtained from the multiple regression analysis using the restricted sample did not significantly differ from the results obtained when the entire sample was included. Therefore, because of the difficulty of interpreting transformed variables and the desire to include the largest number of participants, we reported the results of hypothesis testing that used the original (nontransformed) values for number of exercise sessions completed and data from all 190 participants.

Results

Baseline Survey

At baseline, 41% (n = 78) of the sample described their health as fair or poor. The mean mobility difficulty score was 2.6 (SD = 1.3) on a 0 to 4 scale, indicating that on average physical mobility was somewhat limited. Fifty-nine percent (n = 112) of participants reported 0 minutes of weekly walking at baseline. Twenty-nine percent (n = 56) reported walking 60 minutes or less per week, and 12% (n = 22) reported walking more than 60 minutes per week. Current physical activity guidelines recommend at least 30 minutes of physical activity of at least moderate intensity on most, preferably all, days per week (Physical Activity Guidelines Advisory Committee, 2008).

Mean scores for self-efficacy, outcome expectations, and exercise self-definition are presented in Table 1. Self-efficacy scores indicated that participants were on average “a little” to “somewhat” confident that they could perform the exercises; 21% (n = 40) of the sample scored 5 or less, indicating they were “very” unsure they could perform the exercises, whereas 17% (n = 33) had a total score of 25 or greater, indicating they were “very” confident in their ability. Overall, outcome expectation scores were high; 40% (n = 79) of participants reported the maximum score of 30, indicating high confidence that the exercises would improve their health. The scores for the total Exercise Self-Definition scale showed that, on average, participants were “a little” to “somewhat” sure of defining themselves as exercisers. Social acknowledgement subscale scores indicated that on average participants were only “a little” certain that they considered themselves to be exercisers or that others would consider them exercisers. Twenty-five percent (n = 48) scored three or less on this subscale. In contrast, Value of Exercise subscale scores were high; overall, women were “very sure” that they would enjoy being an exerciser but less sure that being known as an exerciser or having significant others exercise was important to them. The mean Competence subscale score was roughly in the middle of the scale, indicating that on average participants were only somewhat certain that, compared to others, they were good at exercising.

Exercise Adoption

Eighty-four women (44%) completed at least one exercise session while 106 women (56%) completed 0 sessions (range 0 to 39). The mean number of sessions completed over the 8 weeks was 5.7 (SD = 8.84) out of a recommended 24.

Bivariate correlations showed that self-efficacy, outcome expectations, and Value of Exercise scores were significantly related to exercise adoption ($r = 0.14$, $p < .05$; $r = 0.17$, $p < .05$; $r = 0.20$, $p < .01$, respectively). In Table 3, we present the hierarchical regression model using non-transformed data from all study participants (N = 190). The results are described in terms of R which is the square root of R-Squared and is the correlation between the observed and predicted values of dependent variable; R-Squared (R^2) which describes how much of the variance in the dependent variable is accounted for by the model; and adjusted R^2 which modifies R-squared by taking into account the number of covariates included in the model. The set of sociodemographic variables were entered in step 1 and R was not significant ($R = .17$, $F [3, 190] = 2.21$, $p = .13$; $R^2 = .03$; adjusted $R^2 = .01$), indicating no relationship between this set of variables and exercise adoption. In step 2, after entering the set of health status variables, R was not significant ($R = .25$, $F [6, 190] = 1.92$, $p = .06$; $R^2 = .06$; adjusted $R^2 = .03$), again indicating no significant relationship between these variables and exercise adoption. In the final step, after incorporating the set of sociocognitive variables, R was significant ($R = 0.34$, $F [11, 190] = 2.05$; $R^2 = .12$; adjusted $R^2 = .06$), indicating a significant relationship between these variables and exercise

adoption. Additionally, Value of Exercise scores and recruitment site independently predicted exercise adoption ($\beta = 0.20$, $p = .03$; $\beta = -0.19$, $p = .04$, respectively).

Discussion

The purpose of this study was to test the ability of an expanded Social Cognitive Theory model to predict the adoption of a community-based group exercise program among older, low-income, primarily African American women at risk for cardiovascular disease. We hypothesized that self-efficacy, outcome expectations, and exercise self-definition would predict the number of exercise sessions completed over 8 weeks. Our model was not supported and explained a disappointing 6% of the variance in exercise adoption. Restricting our focus to cognitive variables may have been insufficient and future work should address the influence of sociocultural and environmental factors. Value of Exercise scores independently predicted exercise adoption. This finding is consistent with SCT, which states that motivation is enhanced when the behavior of interest is rooted in the individual's value system. Finding ways to strengthen these values to increase motivation to exercise may prove valuable.

Self-efficacy scores were lower than outcome expectation scores, suggesting that participants were confident that exercise leads to positive health outcomes but less confident in their ability to perform the exercises. Despite a significant bivariate relationship, self-efficacy did not independently predict exercise adoption. Dornelas, Stepnowski, Fischer, and Thompson (2007) also reported no predictive relationship between self-efficacy and exercise participation in their study of African American and Hispanic women. Their participants were younger and healthier than our participants but exercise rates were similarly low (37% completion rate compared to our 28% completion rate).

Our findings run counter to Bandura's assertions that self-efficacy is the focal determinant of exercise adoption as well as the results of other studies that have reported self-efficacy to predict exercise. Women with higher levels of self-efficacy have been found to exercise more than women with lower levels (Ainsworth et al., 2003). Our participants reported little to no weekly walking at baseline so it was not surprising that their self-efficacy scores were in the low to moderate range. Additionally, we measured self-efficacy with an exercise-specific instrument that assessed confidence in one's ability to regularly perform exercise. Recent studies have shown that different types of self-efficacy, such as confidence in one's ability to exercise in the face of barriers, are associated with exercise participation among older and socioeconomically disadvantaged adults (Brawley, Rejeski, & King, 2003) as well as African American women (Resnick, Vogel, & Luisi, 2006). It is possible that examining these types of self-efficacy would have lead to different results.

Outcome expectations were high but did not translate into regular participation. Perhaps the benefits of exercise did not outweigh perceived barriers associated with attending class. Although the health-related benefits of exercise were important to these women, they were not enough to influence behavior change. Exploring the influence of additional benefits of exercise, such as stress reduction or weight loss in addition to negative expectations such as pain, shortness of breath, or sweating may be more informative (Resnick, Vogel, & Luisi, 2006).

Social Acknowledgment and Competence scores did not predict exercise adoption. These findings could be attributed to the lack of exercise experience among study participants and, though it is not possible to know from this study, a lack of exercise among their social contacts. Knowing people who exercise and seeing people exercise have been associated with exercise participation among older African American women from lower

socioeconomic backgrounds (Ainsworth et al., 2003; Eyler et al., 2003). Individuals' behaviors are influenced by the values and behaviors of those around them (Bandura, 1997). A great deal of behavioral modeling occurs in everyday social networks; people with whom we regularly interact determine the types of competencies, attitudes, and motivation that we repeatedly observe (Bandura, 1997). Therefore, social influences and cultural norms that do not support being physically active could negatively affect exercise adoption regardless of whether one personally values exercise and recognizes its health-related benefits. A thorough exploration of sociocultural and environmental influences on exercise participation is needed.

Participants who were recruited from Health Center B were more likely to adopt the exercise program than those from Health Center A, a finding that may be related to the culture of clinic B or characteristics of the health care providers at this site. Further exploration of this relationship might be useful and supports the need to examine contextual factors.

By design, our community-based exercise intervention attempted to minimize common environmental barriers; the program was free, close to home, and held in a safe, climate-controlled environment. Physicians delivered brief, but individualized, exercise counseling that resulted in over 50% of participants completing the recommended exercise testing and 44% completing at least one exercise session. Unfortunately, the combination of physician recommendation and a free community-based group exercise program was not strong enough to influence ongoing participation. It is possible that participants needed a stronger, more comprehensive intervention that provided on-going support from the health care system for behavioral change, built upon personal values and perceived benefits of exercise, and addressed sociocultural barriers that affected exercise participation.

Prior to further intervention development, we suggest an exploration of the factors that promote a sedentary lifestyle and the attitudes surrounding the idea of reducing cardiovascular risk through exercise. We need to capture the essence of the sociocultural and physical environment experienced by sedentary women who have been told by their health-care provider to start exercising. To learn more about the influence of these contextual elements on women's experience with exercise, we suggest additional fieldwork using qualitative techniques. We would like to learn more about what is going on in women's lives as they make decisions about whether or not to start exercising. We want to obtain views and opinions about the role social others play in facilitating or impeding behavioral change, to review commonly held perceptions about the appropriateness of exercise, and identify strategies to overcome common environmental barriers to exercise. Such information will provide useful knowledge for the development of interventions to increase exercise adoption.

There are several limitations to this study. First, the sample was not randomly selected from the targeted population, thereby limiting the generalizability of study findings to older, female patients receiving primary care in urban university-affiliated health centers. Secondly, instruments used to measure baseline variables had limited prior psychometric testing. Finally, our exercise participation rate was low, although comparable to rates reported by a national survey of women similar to our targeted population (Brownson et al., 2000).

Older, minority, and low-income women report the lowest levels of exercise. Interventions are needed that build upon values and perceived benefits of exercise that strengthen confidence in exercising on a regular basis despite perceived barriers. We encourage additional fieldwork to identify sociocultural and environmental factors that affect exercise adoption because these factors may be more influential than cognitive variables. Using this

information to develop community-based interventions delivered in combination with provider-based exercise counseling may result in sustainable, cost-effective approaches that enhance exercise adoption.

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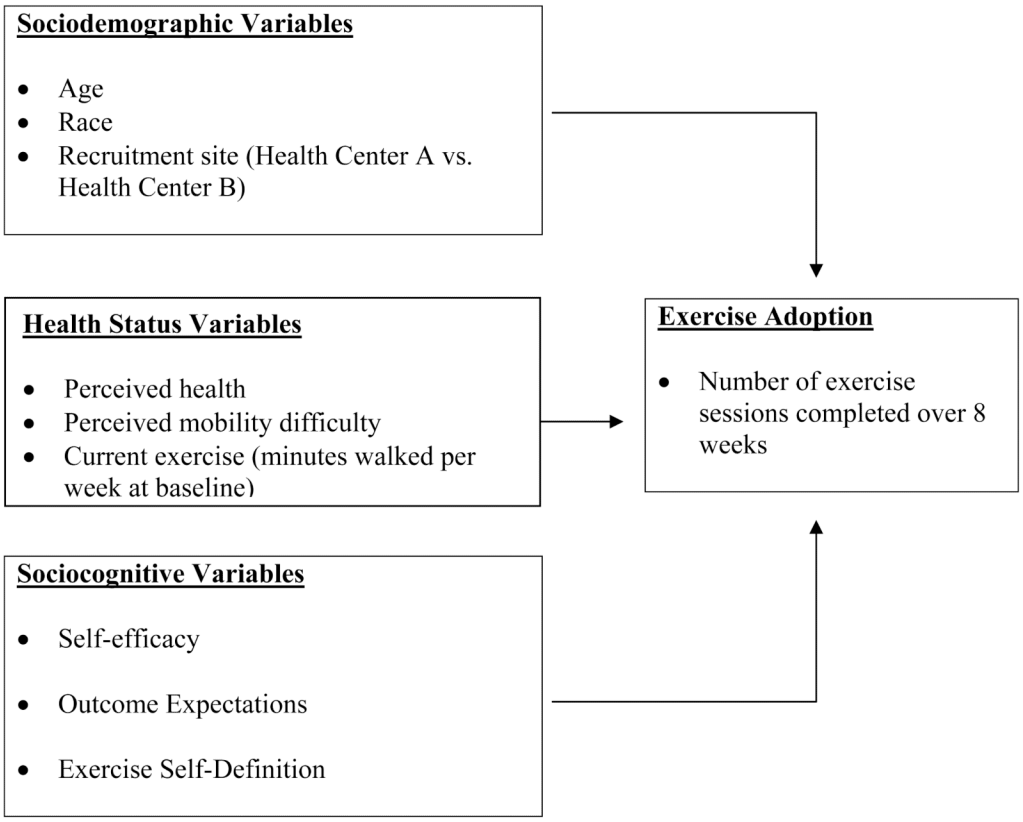

Figure 1. Hypothesized Model of Exercise Adoption

Figure 1 describes the relationships tested in this study.

We proposed that selected sociodemographic variables are related to exercise adoption. These factors include age, race, and recruitment site and were controlled in the regression analysis.

We also proposed that selected health status variables were related to exercise adoption. These factors include perceived health, perceived mobility difficulty, and current exercise. The effects of these variables were controlled in the regression analysis. The sociocognitive variables included in this study were self-efficacy, outcome expectations, and exercise self-definition. We hypothesized that these variables would independently predict exercise adoption.

Our outcome variable was exercise adoption, defined as the number of exercise sessions completed over 8 weeks.

Table 1

Baseline Mean Scores and SD for Self-efficacy, Outcome Expectations and Exercise Self-definition (N = 190)

Variable	No of Items	Possible Range of Scores	Mean	SD
Self-efficacy	3	0 to 30	13.97	8.65
Outcome Expectations	3	0 to 30	23.87	8.15
Exercise Self-Definition scale (total)	11	0 to 110	55.37	21.85
Social Acknowledgment	4	0 to 40	12.46	10.34
Value of Exercise	4	0 to 40	28.28	9.10
Competence	3	0 to 30	14.63	7.8

Table 2

Hierarchical Multiple Regression for Number of Exercise Sessions Completed during Weeks 1 - 8 (N = 190)

	Step 1			Step 2			Step 3		
Variable	**β**	**t**	**p**	**β**	**t**	**p**	**β**	**t**	**p**
Age	-0.01	-0.13	.90	-0.02	-0.27	-.79	0.02	0.31	.76
Race	-0.07	-0.74	.46	-0.10	-1.11	.27	-0.14	-1.47	.14
Health Center (A vs. B)	-0.21	-2.27	.03*	-0.19	-2.13	.04*	-0.19	-2.08	.04*
Perceived Health Status				-0.12	-1.56	.12	-0.11	-1.39	.17
Perceived Mobility Difficulty				-0.04	-0.51	.61	-0.08	-0.91	.36
Minutes Walked/Wk at Baseline				-0.13	-1.81	.07	-0.10	-1.29	.20
Self-efficacy							0.03	0.27	.79
Outcome Expectations							0.07	0.85	.40
Social Acknowledgment							-0.12	-1.29	.20
Value of Exercise							0.20	2.22	.03*
Competence							-0.09	-0.85	.40
R		.17			.25			.34*	
R^2		.03			.06			.12	
Adjusted R^2		.01			.03			.06	

*$p < .05$.

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