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Perceived Barriers to Exercise in Hispanic Adults by Level of Activity

Lorraine Bautista, Belinda Reininger, Jennifer L. Gay, Cristina S. Barroso, and Joseph B. McCormick

Bautista and Barroso are with the Michael & Susan Dell Center for Advancement of Healthy Living, University of Texas School of Public Health, Brownsville Regional Campus. Reininger, Gay, and McCormick are with the Dept of Behavioral Science, The University of Texas School of Public Health, Brownsville Regional Campus.

Abstract

Background—National data show that Hispanics report low levels of physical activity. Limited information on barriers to exercise in this population exists in the literature.

Methods—Surveys were administered to 398 Hispanic participants from two *colonias* in South Texas to investigate self-reported levels of and perceived barriers to exercise. One-way ANOVA by level of activity and *t* tests by gender were conducted. Exploratory factor analysis was used to examine patterns by level of activity.

Results—Results show that 67.6% of respondents did not meet physical activity recommendations of at least 150 minutes per week, as compared with 55.6% nationally. Overall, the most frequently reported barriers included “lack of time,” “very tired,” and “lack of self-discipline” to exercise. An exploratory factor analysis of the barriers reported by participants not meeting physical activity recommendations resulted in a 3-factor structure. A unidimensional scale was found for participants meeting recommendations.

Conclusions—Findings suggest that future interventions should be specific to gender and exercise level to address the high prevalence of inactivity in this population.

Keywords

Mexican Americans; physical activity; survey research

Engaging in physical activity has been recognized to have numerous health benefits.^{1–3} Regular participation in moderate physical activity has been shown to improve mental health, reduce overall morbidity and mortality,⁴ and decrease the risk of various chronic conditions including cardiovascular diseases,⁵ certain cancers, osteoarthritis,³ non-insulin-dependent diabetes mellitus, osteoporosis,⁶ and obesity.¹ According to the U.S. Department of Human Health Services, the weekly physical activity recommendations for adults are at least 150 minutes of moderate-intensity or 75 minutes of vigorous-intensity aerobic physical activity for substantial health benefits.⁷ Despite the many health benefits, national data report that fewer than half of the adult U.S. population meets the physical activity recommendations.⁸

Troubling are the even lower trends of physical activity in Hispanic men and women. At present, Hispanics are the largest minority group in the United States representing approximately 15% of the population.⁹ According to a 2008 report of the National Health Interview Survey, all Hispanic subgroups had lower levels of leisure-time physical activity than non-Hispanic whites.¹⁰ Data from the 2005 Behavioral Risk Factor Surveillance System (BRFSS) reported that more Hispanics than whites do not meet national

recommendations for physical activity.⁸ Both Hispanic men and women reported lower prevalence of regular physical activity (41.9%, 40.5%) than their non-Hispanic White counterparts (52.3%, 49.6%).⁸

In 2006, Texas had the second largest number of Hispanic residents at 8.3 million, nearly a 25% growth rate from 2000 to 2006.¹¹ The majority of the Texas Hispanic population resides in the southern and western parts of the state, along the U.S.-Mexico border.¹² This population is disproportionately affected by chronic conditions issues such as elevated blood pressure, central adiposity, diabetes and obesity (BMI \geq 30).¹³ The 2006 Texas Behavioral Risk Factor Surveillance System (TX BRFSS) stated that nearly 72% of this population had a BMI of 25 or greater.¹⁴ When compared with the U.S. and Texas populations, the southernmost 4 counties known as the Rio Grande Valley (RGV) have disproportionately high rates of obesity (30.8%) and diabetes (12.8%) compared with 26.3% and 8.0% nationally.¹⁵

The increased risk of chronic conditions coupled with the lower levels of physical activity in the RGV (approximately 41%)^{16,17} compared with U.S. Hispanics (44.5%)¹⁸ poses a public health concern. Therefore, increasing physical activity in the Hispanic population is a chief objective for numerous public health initiatives in Healthy People 2010.¹⁹ In the Hispanic population, the increased prevalence of diabetes and has brought the need to promote physical activity to the forefront of national, state, and local public health initiatives.¹⁹⁻²¹

To address the lack of physical activity among Hispanics in the RGV, there is a need to examine the specific determinants of physical activity in Mexican-Americans living on the U.S.-Mexico border.²² Identifying and understanding these correlates is necessary to effectively address the low rates of physical activity and design interventions that can address modifiable intra- and interpersonal factors. This research may lead to increased levels of physical activity in this health disparate population.²² Thus, this study had 2 primary objectives: to examine perceived barriers to exercise stratified by gender and level of exercise, and to describe the factor structure of perceived barriers.

Methods

Participants

Cross-sectional data from a baseline evaluation survey of a community-wide media campaign was used for this study. Participants were Spanish-speaking, Hispanic adults living in *colonias* (lower income, unincorporated neighborhoods) in Cameron and Webb counties. Both counties are located along the U.S.-Mexico border in the RGV. Study participants were recruited by the random selection of a geographical starting point, navigational direction, and resident within the household. *Promotoras* (outreach workers familiar with the community) identified a starting point within the *colonia*, randomly selected a direction to begin approaching homes. The adult with the next upcoming birthday was asked to participate in the study. Promotoras were trained in questionnaire administration and recruitment methodology. Informed consent was obtained before data collection. All interviews were conducted in Spanish, the preferred language of the participants. Participants received a small monetary incentive for their participation. All procedures and instrumentation were approved by the Committee for the Protection of Human Subjects before recruitment and data collection.

Instrumentation

To assess the level of engagement in exercise, respondents were asked if they had participated in any form of exercise during the past 30 days, not counting any activity that was part of their work or employment (Spanish version of the 2005 BRFSS, question 4.1²³).

The response format was “Yes,” “No,” “I don't know,” or “Refused.” To evaluate levels of exercise related to physical activity recommendations for adults, respondents were asked to report the frequency and duration of their normal exercise activity per week (2005–2006 National Health and Nutrition Examination Survey (NHANES), questions PAQ.281 and PAQ.300²⁴). Activities reported were of at least moderate intensity. Responses were recorded in times per week exercised and average number of minutes exercised each time. Examples of exercises provided within the question were of moderate intensity (eg, brisk walking). Based on this information, total time engaged in exercise for the week was calculated in minutes. Therefore the benchmark for meeting recommendations was set at 150 minutes to align with the recommendations by the U.S. Department of Human Health Services.⁷

In addition, in preparation for the intervention and its evaluation 9 focus groups were conducted with Hispanic men and women to explore concepts related to health, physical activity and healthful food choice. The results from the focus groups were used to create additional items to assess barriers to physical activity.

The final survey consisted of 41 items on demographic characteristics, employment status, self-rated health, self-reported physical activity, and perceived barriers, attitude, and self-efficacy toward physical activity. All items not yet translated underwent forward and backward translation. Community members and bilingual staff were asked to review the questionnaire to ensure that items were culturally appropriate and Spanish translations were analogous to the local dialect.

Self-Reported Exercise—A variety of terms have been used to describe physical activity. Exercise, a subtype of physical activity, is defined as the planned, structured and repetitive bodily movement intentionally performed with the purpose of improving or maintaining physical fitness or health.²⁵ In the Hispanic population it is possible that occupation, culture and language can influence the interpretation and therefore the measurement of “physical activity.”^{26,27} In light of this uncertainty, the investigators chose to use the term “exercise” for measurement purposes to address the intent behind the action.

Perceived Barriers—To assess perceived barriers to exercise, 16 barrier items were included in the questionnaire. Items were prefaced by the following question: “How often do the following things prevent you from exercising?” Responses to the items were measured using a 5-point Likert scale with anchors of “Never” (1) to “Very Often” (5).

Procedure

The data for this study were collected through face-to-face interviews by *promotoras*, carried out on weekdays during the months of January 2005 and October 2006. The study sample consisted of 411 adults living in 2 selected colonias in Cameron and Webb counties. The response rates were 87.6% in Cameron County (210 attempts; 26 refusals) and 90.9% in Webb County (210 attempts; 19 refusals).

Data Analysis

All data were entered and analyzed using SPSS Statistics version 17.²⁸ All inferences are at $\alpha = .05$ level. Descriptive statistics were computed for the overall sample.

Self-Reported Exercise—Total time engaged in exercise activity for the week was calculated in minutes. Using both exercise items, participants were categorized into 3 different exercise groups. Participants who reported no engagement in exercise for the past 30 days were labeled Non-Exercisers (NE). Participants who reported frequency and

duration of exercise were categorized as either Exercisers Not Meeting (ENM) or Exercisers Meeting (EM) physical activity recommendations. Frequencies were calculated and a χ^2 test was used to test for significant differences in exercise behavior between genders.

Perceived Barriers—Mean scores for the 16 items indicated low variance in reported items, therefore, responses were dichotomized to indicate any occurrence of the perceived barrier. Frequencies were used to rank order barrier to exercise for all participants, by gender, and by exercise group. The total number of barriers reported by participant was calculated and means were compared using separate oneway ANOVAs by exercise group.

Exploratory Factor Analysis—A principal components analysis with an orthogonal (Varimax) rotation was used to identify the factors underlying perceived barriers to participation in exercise. A minimum Eigenvalue of 1.0 was used for factor inclusion and scree plots were examined to confirm appropriate number of factors. A primary factor loading below 0.4 or cross-loading were the criteria for item elimination to maintain simple structure.²⁹ Items were eliminated 1 at a time, and factor analysis was conducted on remaining items to reexamine factor loadings. The factor analysis was initially performed on the entire sample (N = 374). However, there were differences in the proportions reporting barriers by exercise group, suggesting that the perceived barriers may differ by level of exercise. Therefore, separate analyses were performed for EM and for the NE and ENM groups. These factors were assessed for reliability using Cronbach's alpha³⁰ as a measure of internal consistency.

Results

A total of 398 surveys were completed in colonias along the south Texas—Mexico border. Sample characteristics are provided in Table 1. The sample consisted of 61 men (15.4%) and 334 women (84.6%). The respondent's ages ranged from 18 to 96 years, with a mean of 43 years. The majority of respondents reported being unemployed or a homemaker (72.4%, n = 288); having no medical insurance (81.7%, n = 325) and less education than a high school degree or equivalent (89.1%; n = 353).

Fourteen self-reported exercisers did not provide exercise time data and were therefore excluded from analyses. One respondent did not respond to the first screening item, but did provide data for frequency and duration of normal exercise, and was included in the appropriate exercise category. In addition, there were 22 participants who reported being nonexercisers but provided frequency and duration data for normal weekly exercise. These participants gave responses indicating that despite not having engaged in exercise during the previous 30 days from the survey, they usually participate in exercise activities and were therefore included in the appropriate category. Of these 22 people, 10 met the physical activity recommendations.

Nearly two-thirds (64.6%) of respondents reported having participated in some form of exercise during the prior 30 days. Based on reported frequency and duration for a normal week, time spent exercising ranged from 5 to 1680 minutes per week (Mean = 212.4 ± 230.7). Any results more than 3 standard deviations from the mean were considered outliers and were excluded, resulting in 6 of 263 responses excluded. Participants were evenly distributed across the 3 exercise groups. There were slightly more ENM (36.4%); however, there were no significant differences in membership among the 3 exercise groups. There were no significant differences for gender by exercise groups.

Perceived Barriers

A total of 398 participants responded to the 16 barrier questions on the survey. Responses were dichotomized due to low variance in reported items such that a response of “Never” was recorded as 0 and any other response as 1. Approximately 19% of respondents did not identify any barriers to exercise while 0.5% reported 16 barriers—the maximum number that could be reported—and the mean number of barriers reported was 3.6 (± 3.3). To identify the most frequently reported barriers, rank lists of the barrier items were compiled separately for participants by gender and by exercise group (Tables 2 and 3).

Table 2 presents the barrier items ranked by gender. Based on a χ^2 test, a greater proportion of women reported the items “lack of self-discipline” and “lack of child-care to be able to exercise.” There were no other significant differences by gender.

Differences in reported barriers were examined by exercise groups. There were significant differences by exercise group in 9 barriers (Table 3). NE reported “lack of interest in doing exercise,” “lack of a safe and convenient place to do exercise,” “lack of equipment/accessories,” and “lack of knowledge about exercise” more than both groups of exercisers. NE also reported “don't like to do exercise/or I think exercise is boring,” “lack of child-care to be able to exercise,” and “very tired” more than Exercisers who meet recommendations. A significantly larger portion of NE's and ENM's reported “lack of time” than EM. Results also indicated that “lack of self-discipline” differed significantly for all 3 exercise groups, reported least by EM and most frequently by NE.

Pairwise differences in the mean number of barriers reported among the 3 exercise groups were assessed. The Tukey post hoc procedure was performed to control for multiple comparisons with all inferences interpretable at the $\alpha = 0.05$ level. Post hoc analysis indicated significant differences in both the reporting and the total number of barriers reported by exercise group. EM were significantly less likely to report barriers than NE and ENM. Finally, there was a significant difference in the number of barriers reported by each exercise group. A higher number of barriers was reported by NE ($M = 4.8$) than ENM ($M = 3.5$) or EM ($M = 2.5$). There were no other significant findings.

Exploratory Factor Analysis

Initially, the factorability of the 16 barriers was examined. Several well-recognized criteria³¹ for the factorability of a correlation were used. First, it was observed that 14 of the 16 items correlated at least 0.3 with at least 1 other item, suggesting reasonable factorability. Second, the Kaiser-Meyer-Olkin measure of sampling adequacy was 0.826, above the commonly recommended value of 0.60, and Bartlett's Test of Sphericity was significant ($\chi^2 (120) = 1586.96, P < .001$), further confirming that each item shared some common variance with other items. Given these overall indicators, factor analysis was deemed to be suitable with all 16 items.

Non-Exercisers & Exercisers Not Meeting Recommendations—Principal component analysis for all 16 items was performed. Eigenvalues and scree plot suggested that 3 factors should be extracted. Table 4 presents the factor loadings, Eigenvalues, proportion of variance explained, and Cronbach's alpha. The 3 factors explained a total of 60.5% of the variance. Seven items were eliminated due to cross-loading and low loadings, and the final structure emerged with 9 items that created 3 subscales. Factor loadings for these 3 scales ranged from 0.63 to 0.87 (Table 4).

Factor 1 ($\alpha = 0.76$) deals primarily with personal barriers to exercise such as “lack of interest,” “lack of self-discipline” and “dislike of exercise” and was labeled *Personal*

Barriers. The second factor, *Physical Comfort Barriers*, consists mainly of barriers related to physical comfort while exercising such as “worrying about appearance while exercising,” “being too overweight,” “feeling very tired,” and “the weather or outside temperature.” The final factor, *Commitments Barriers*, reflects barriers caused by other obligations such as “lack of time” and “lack of child-care” to be able to exercise.

Exercisers Meeting Recommendations—Principal component analysis for all 16 items was performed. Eigenvalues and scree plot suggested that 1 or two factors should be extracted. A two factor solution was attempted but did not conform to simple structure. The final structure (Table 5) emerged with 9 items that created 1 subscale. The factor loading for the 9 items ranged from 0.44 to 0.72 for the single factor. The 9 items had acceptable internal consistency ($\alpha = .76$) and may simply represent general barriers to physical activity.

Discussion

Hispanics have higher rates of obesity and diabetes and lower prevalence of meeting PA recommendations. This study examined amount of and barriers to exercise participation in largely Hispanic communities on the U.S.-Mexico border in Texas. This study also included the development of a barrier scale to exercise for this population and psychometric properties from a factor analysis.

In contrast to previous findings in south Texas^{13,14} and other Hispanic populations,^{14,15,32} fewer participants in this study reported not exercising at all (31.3%), and a larger percentage did not meet PA recommendations (36.4%). When stratified by gender, a smaller proportion of both men (39.7%) and women (30.9%) in this study met PA recommendations compared with men (51.5%, 47.9%) and women (47.4%, 45.1%) in national data from 2007.¹⁸

The disparity in the results may be due to the variation of how the terms exercise and physical activity are interpreted. Capersen et al²⁵ described exercise as a subset of physical activity with the objective of improving or maintaining physical fitness. Focus groups in African-American, Asian-American, Hispanic and Native American females have reported that the two terms are used interchangeably.²⁷ With nearly one-third of the current sample not exercising at all, and therefore not obtaining the potential health benefits of exercise, the need to target inactivity in this population is evident. In addition, given that lack of meeting moderate-to-vigorous physical activity recommendations is a strong predictor of obesity,^{33,34} an emphasis on increasing exercise among exercisers not meeting recommendations, not just inactive individuals, is essential.

Perceived Barriers

A rank ordering of barriers by prevalence identified 3 barriers reported by at least 40% of all respondents: “lack of time for exercising,” “very tired,” and “lack of self-discipline to exercise.” This is aligned with a study by Mier et al,³⁵ (N = 39) who reported that Mexican-American adults with Type-2 diabetes cited lack of time due to family and work-related obligations as a barrier to physical activity. Studies in immigrant Latinas^{22,32} (N = 49, N = 671) and older women (African American, Hispanic, Native American/Native Alaskan, and Caucasian U.S. women)³⁶ (N = 2912) also report that lack of time, being too tired, lack of energy, and low will-power were barriers to physical activity.

The rank order of barriers reported by women in our sample was almost identical to the rank order for the whole sample. However, the majority of participants were women (84.6%) which may explain the similarities. Reports of “lack of self-discipline” and “lack of child-care to be able to exercise” were significantly more prevalent for women than men. These

results are aligned with findings from similar studies in Latina women which report that family obligations, care-giving, child care, and lack of relatives to help care for children were barriers to exercise.^{27,35,37} Additionally, in a study assessing stages of change for exercise in older women, care-giving was in the top 5 barriers reported by Hispanic women (n = 602) in all stages from precontemplation to action.³⁶

There is limited data on self-discipline in relation to exercise or physical activity in Hispanics. A review of correlate and determinant studies suggests similar constructs such as self-motivation, perceived behavioral control and self-efficacy, are associated with physical activity in Hispanic women.³⁸ Future studies may focus on the addressing self-motivation and self-efficacy for exercise along with self-discipline to better understand the relationships among these constructs. In addition, strategies and messages promoting exercise for mothers and caregivers may be instrumental in increasing the number of women meeting physical activity guideline recommendations.

The two most common barriers reported by men were “lack of time” and “very tired.” A significantly smaller proportion of men than women reported “lack of self-discipline” and “lack of child-care to be able to exercise.” The differences may be attributable to the influence of traditional gender roles which indicate that domestic responsibilities such as child-care are left to the women of the household.²⁷ Since a large portion of literature regarding barriers to exercise for Hispanics is specific to Hispanic women, data on barriers for Hispanic men is limited.³⁸ The high percentage of inactivity reported by men (60.3%) in this sample compared with national data warrants further study of the role of perceived barriers to exercise in Hispanic men.

When examining barriers by exercise group, 4 barriers were reported with high frequency for all 3 exercise groups: “lack of self-discipline,” “lack of time,” “very tired,” and “the weather (temperature).” Of these, all but “lack of self-discipline” have been found to be significant correlates of physical activity in other samples of adult men and women.³⁸ The proportion of participants reporting these barriers differed by group, with the highest proportion in nonexercisers and lowest in exercisers meeting recommendations. In addition, reporting of “lack of self-discipline” and the mean number of total barriers reported significantly decreased as the level of exercise increased. These results suggest that while all respondents perceived similar barriers to exercise, the extent to which the barriers were reported and impacted exercise participation decreased as exercise increased. Perceived barriers have been well documented as significant correlates of physical activity.^{38,39} Reichert et al⁴⁰ reported a strong positive association between number of perceived barriers reported and physical inactivity in a population-based study. These studies suggest that tailored programs by activity level (ie, those not meeting and those who are inactive) and targeted at determinants specific to exercise level may be effective in increasing exercise behavior.

Factor Analysis

An exploratory factor analysis for Non-Exercisers and Exercisers Not Meeting physical activity recommendations yielded 3 underlying factors: personal barriers (3 items), physical comfort barriers (4 items), and commitments barriers (two items). Due to fair to moderate internal consistencies (Cronbach's α values ranging from 0.55 to 0.76), the labels used for these factors are not proposed as definitive constructs. However, each of the factors may be strengthened by the addition of more items and the revision of items with lower primary loadings. Furthermore, these findings could be used to guide future research in characterizing perceived barrier influences on exercise behavior in this population.

Factor analysis results for Exercisers Meeting physical activity recommendations suggest that the barriers factor structure is unidimensional for this subgroup. Items in the single-factor solution are well supported in the literature as correlates to exercise.^{38,40} The single-factor solution may be attributed to low variation for items due to a low number of reported barriers by this subgroup. While exercisers meeting recommendations reported barriers to exercise, it was to a lesser extent than Non-Exercisers and Exercisers not meeting recommendations. Other studies have reported analogous findings regarding perceived barriers reported by exercisers in other populations including men and women Brazilians, older African American women and college undergraduates.⁴¹⁻⁴³

The findings of this study must be taken in the context of several limitations. First, the study was cross-sectional in design, which limits the inferences of causality. However, the purpose of this research was designed to capture data from primarily Spanish-speaking adults in low SES areas along the U.S.-Mexico border in Texas shown to be at high risk for various preventable chronic diseases. There is presently a lack of literature on this population. Future studies may examine perceived barriers over time in relationship to changes in activity level, particularly in preparation for interventions. Secondly, these results are based on self-reported data, which are prone to overestimation. While intensity of exercise was not measured, the activities the participants reported were classified as moderate intensity as the examples provided in the question were moderate. There was no validation of either time or intensity of the exercise reported by other instrumentations. This method of categorization has the potential to misclassify participants as not meeting guidelines as the survey items assume moderate, not vigorous, intensity activities. Questions were not asked separately for moderate or vigorous intensity, therefore no adjustment was made statistically for minutes of vigorous intensity exercise. To attenuate for this and capture at least the minutes engaged in vigorous activity, definitions for moderate and vigorous intensity exercise were provided to participants before asking the exercise questions.

The results of this study add to the literature by examining a population that is highly burdened by obesity, but still understudied. More studies are needed to objectively quantify the frequency, duration, and intensity of physical activity among Mexican Americans living along the RG. Thirdly, surveys were conducted during work hours on weekdays, therefore, the data may overly represent individuals who are not employed or who normally stay at home. The sample characteristics limit the external validity of the sample. However according to the 2007 BRFSS, 69.6 to 71.4% of women in the two communities sampled are considered overweight, and 34.0 to 35.2% not engaging in any leisure-time activity.¹⁸ Thus, the participants in this sample may be at greater need for physical activity programming. Based on these results, the different cultural and societal expectations for women appear to affect their exercise participation.

In conclusion, findings from this study provide insight regarding perceived barriers in relation to exercise participation in the Hispanic population along the Texas border with Mexico. Separate programs specific to women and individuals not meeting physical activity recommendations are needed in this population in an effort to reduce health disparities. These programs may reduce obesity by increasing the proportion of adults meeting physical activity recommendations and thereby meeting the objectives set forth by Healthy People 2010 and Healthy Border 2010.^{19,44}

Determinants of physical activity in the general population include demographic, cognitive, social, and physical environment characteristics. Self-efficacy is the most consistent psychological correlate of physical activity and perceived barriers and social support are also regularly identified as correlates.⁴⁵ Several intrapersonal and interpersonal determinants of physical activity have been identified in the Hispanic population. Perceived self-efficacy,

acculturation, social support, socioeconomic status, perceived barriers, age, and self-rated health have been significantly associated with exercise.^{10,22,35,46–51}

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Table 1

Demographic Characteristics of Participants (N = 398)

Characteristic	N	%
General health		
Excellent and very good	19	9.3
Good	107	26.9
Regular	200	50.3
Bad	42	10.6
Demographics		
% Unemployed	288	72.4
% Women	334	84.6
% Less than HS degree	353	88.6
Marital status		
Married	222	55.8
Divorced	25	6.3
Widow	44	11.1
Separated	35	8.8
Single	35	8.8
Common law	34	8.5
Medical insurance		
Private	21	5.3
Medicaid/Medicare/CHIPS	50	12.6
None	325	81.7

Table 2

Prevalence (%) of Barriers by Gender

Items	Men (n = 61)	Women (n = 333)	$\chi^2(1)$
Lack of time	36.1	43.2	1.089
Very tired	36.1	43.2	1.089
The weather (temperature)	31.1	37.5	0.908
Lack of interest in doing exercise	26.2	36.3	2.332
Lack of self-discipline	26.2	42.9	5.983 **
My physical condition does not allow me to exercise	19.7	17.4	0.188
Nobody to do exercise with	19.7	21.9	0.154
Lack of equipment/accessories	18.0	18.9	0.027
Lack of a safe and convenient place to do exercise	16.4	26.7	2.926
I am too overweight to exercise	14.8	15.6	0.029
Don't like to do exercise or I think exercise is boring	11.5	11.4	0.000
Lack of knowledge about exercise	11.5	15.6	0.694
Very conscious of my physical appearance while doing exercise	8.2	12.9	1.072
I don't like to sweat / affect my appearance	6.6	4.5	0.473
I do not have child care for me to go and exercise	4.9	28.8	15.668 *
My spouse or partner does not like for me to exercise	4.9	3.6	0.243

* $P < .05$ ** $P < .0001$.

Table 3

Prevalence (%) of Barriers Among Exercise Groups

Items	Nonexercisers (n = 116)	Exercisers not meeting (n = 136)	Exercisers meeting (n = 121)	$\chi^2(1)$
Lack of self-discipline	59.5	37.5	22.3	34.591 ***
Lack of interest in doing exercise	53.4	30.9	19.0	32.238 ***
Lack of time	52.6	45.6	27.3	16.844 ***
Very tired	50.0	44.9	30.6	9.989 **
The weather (temperature)	41.4	35.3	33.1	1.896
Lack of a safe and convenient place to do exercise	37.9	15.4	21.5	17.989 ***
I do not have child care for me to go and exercise	32.8	22.8	16.5	8.721 *
Lack of equipment / accessories	29.3	15.4	13.2	11.739 **
Lack of knowledge about exercise	25.0	12.5	7.4	15.389 ***
Nobody to do exercise with	23.3	21.3	19.0	0.649
My physical condition does not allow me to exercise	21.4	4.4	4.1	3.483
Don't like to do exercise or I think exercise is boring	19.0	10.3	5.8	10.407 **
I am too overweight to exercise	19.0	15.4	10.7	3.168
Very conscious of my physical appearance while doing exercise	12.1	13.2	9.1	1.127
My spouse or partner does not like for me to exercise	5.2	3.7	0.8	3.738
I don't like to sweat / affect my appearance	4.3	18.4	12.4	0.012

Note. Separate analyses were conducted for each barrier.

* $P < .05$

** $P < .001$

*** $P < .0001$.

Table 4
 Summary of Items and Factor Loadings for 3-Factor Solution for Nonexercisers and Exercisers Not Meeting Recommendations (n = 253)

Factors	Items	Factor loading			Communality	Eigenvalues	Variance	Cronbach's α
		1	2	3				
Personal barriers	Lack of interest in doing exercise	0.872	-0.03	0.181	0.796	2.756	30.6%	0.761
	Lack of self-discipline	0.864	0.028	0.201	0.788			
	Don't like to exercise/or I think exercise is boring	0.648	0.274	-0.099	0.508			
Physical comfort barriers	Very conscious of my physical appearance while doing exercise	-0.125	0.718	0.043	0.477	1.550	17.2%	0.619
	The weather (temperature)	0.186	0.625	0.080	0.471			
	I am too overweight to exercise	0.011	0.688	0.161	0.458			
	Very tired	0.347	0.644	0.056	0.489			
Commitments barriers	I do not have child care for me to go and exercise	0.034	0.159	0.812	0.555	1.138	12.6%	0.553
	Lack of time	0.167	0.087	0.796	0.637			

Table 5
 Summary of Items and Factor Loadings for 1-Factor Solution for Exercisers Meeting Recommendations (n = 121)

Factor	Items	Factor loading	Communality	Eigenvalues	Variance	Cronbach's α
Barriers	Lack of interest in doing exercise	0.722	0.521	3.188	35.40%	0.757
	Lack of self-discipline	0.698	0.487			
	Nobody to do exercise with	0.655	0.429			
	Lack of knowledge about exercise	0.646	0.417			
	Lack of equipment/accessories	0.641	0.411			
	Very tired	0.520	0.271			
	Lack of time	0.511	0.261			
	Very conscious of my physical appearance while doing exercise	0.451	0.204			
	The weather (temperature)	0.435	0.189			