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Physical activity levels and perceived benefits and barriers to physical activity in HIV-infected women living in the Deep South of the United States

Kristina E. Rehm and Deborah Konkle-Parker

Abstract

Engaging in regular physical activity (PA) is important in maintaining health and increasing the overall quality of life of people living with HIV (PLWH). The Deep South of the USA is known for its high rate of sedentary behavior although data on the activity levels and perceptions of the benefits and barriers to exercise in women living with HIV in the Deep South are lacking. Understanding the perceived benefits and barriers to exercise can guide the development of PA interventions. We conducted a cross-sectional study to determine the PA levels and perceived benefits and barriers to exercise associated with both age and depression level in a group of HIV+ women living in the Deep South. We recruited a total of 50 participants from a cohort site for the Women's Interagency HIV Study. Depression was assessed using the Center for Epidemiological Studies Depression Scale (CES-D) and benefits/barriers to exercise were measured using the Exercise Benefits and Barriers Scale (EBBS). We measured PA both subjectively and objectively using the International Physical Activity Questionnaire (IPAQ) and a Fitbit physical activity monitor, respectively. Our sample was predominantly African American (96%) and the mean $\pm$ SD age, BMI, and CES-D score were 42 ± 8.8 years, 36.6 ± 11.5 kg/m², and 15.6 ± 11.4 , respectively. Both subjective and objective measures of PA indicated that our participants were sedentary. The greatest perceived benefit to exercise was physical performance and the greatest barrier to exercise was physical exertion. Higher overall perceived benefits were reported by women >43 years and women reporting higher levels of depression. There was no difference in overall barriers associated with age and depression level, but women with depression felt more fatigued by exercise. The results of this study can be helpful when designing and implementing PA interventions in women living with HIV in the Deep South.

Keywords

physical activity; exercise; depression; women; exercise barriers

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Introduction

HIV infection in women is a significant concern (Centers for Disease & Prevention, 2008). The number of African American women with HIV is nearly 15 times that of white women (Centers for Disease & Prevention, 2008). HIV treatment involves administration of antiretroviral drugs that suppress viral replication and increase immune function (Kavanagh et al., 2015). These drugs have greatly increased the life span of people living with HIV (PLWH), making them susceptible to chronic disease (Desai et al., 2015; Neto, Zwirter, & Brites, 2013). Thus, adaptation of a healthy lifestyle that includes regular physical activity (PA) is important to long term health in PLWH.

Physical inactivity is a concern, particularly in the Deep South of the United States (Xu et al., 2013). In PLWH, PA can decrease viral load (Bopp et al., 2004), increase CD4 T cell counts (Ezema et al., 2014), decrease risk of cardiovascular disease (Dolan et al., 2006; Ezema et al., 2014; Jagers et al., 2014; Roos, Myezwa, van Aswegen, & Musenge, 2014), and reduce symptoms of depression (Neidig, Smith, & Brashers, 2003), the most common psychiatric disorder among PLWH (Lowther, Selman, Harding, & Higginson, 2014). Determining the perceived benefits/barriers to PA in PLWH can guide the development of much needed interventions (Pekmezi et al., 2013). In this study, we measured PA levels and benefits/barriers to PA in a group of predominantly African American HIV+ women in the Deep South of the United States and determined differences associated with age and depression levels.

Materials and Methods

Participant Recruitment

We recruited 50 HIV+ that were part of the Women's Interagency HIV Study (Bacon et al., 2005). Participants were recruited after obtaining written informed consent according to a University of Mississippi Medical Center Institutional Review Board approved protocol.

Physical activity measurement

The International Physical Activity Questionnaire Short Form (IPAQ) was used to subjectively assess the number of self-reported days each participant engaged in vigorous or moderate intensity activities (Lee, Macfarlane, Lam, & Stewart, 2011). We objectively measured physical activity for 7 days using a Fitbit activity monitor (Bai et al., 2015; Ferguson, Rowlands, Olds, & Maher, 2015). Steps per day and active minutes per day (activities ≥ 3 METS) (Washington, Banna, & Gibson, 2014) were recorded. We used 10,000 steps as the cutoff for being considered "active" (Tudor-Locke, Hatano, Pangrazi, & Kang, 2008).

Benefits/Barrier Assessment

The Exercise Benefits and Barriers Scale (EBBS) (Sechrist, Walker, & Pender, 1987) assessed perceived benefits and barriers to exercise. Participants are asked to rank their agreement with each of 29 statements (4=strongly agree, 3=agree, 2=disagree, 1=strongly disagree).

Depression Assessment

The Center for Epidemiological Studies Depression Scale (CES-D) (Smarr & Keefer, 2011) was used to measure depression. The CES-D has an established cutoff score of 16 or greater that is indicative of individuals being at risk for clinical depression (Smarr & Keefer, 2011) and has been used extensively in PLWH (Cochran & Mays, 1994; McGuire, Kempen, Localio, Ellenberg, & Douglas, 2015; Neidig et al., 2003; Yi et al., 2006).

Statistical Analyses

Statistical analyses were performed using Microsoft Excel and SPSS v22. The average (standard deviation) for each question was computed. To compare results associated with age, we used the median age (43 years) to split the data into two groups: <43 and ≥43 years. For depression, we used the CES-D cutoff score of 16 to divide the women into two groups: <16 (n=28) and ≥16 (n=22) on the CES-D scale. A two-tailed student's t-test was used to test for statistical differences between the groups. A p value <0.05 was determined to be significant. Reliability of questionnaires was measured using Cronbach's α .

Results

Participant characteristics and physical activity levels

Eighty percent of our participants were overweight (BMI ≥25 kg/m²) and 72% were obese (BMI ≥30 kg/m²) (Table 1). Mean CES-D score was 15.6 (±11.4) and 44% (n=22) of our participants met the cutoff score (≥16) for being at risk for clinical depression. The CES-D had good reliability in our sample (Cronbach's α = 0.881). Eighty four percent of our participants reported no vigorous and 48% reported no moderate intensity activity in the previous seven days. Participants took an average of 7234 (±3075) steps/day and engaged in 32.5 (±37.7) active min/wk.

Perceived benefits and barriers of exercise

The EBBS benefit and barrier scales had good reliability in our sample (Cronbach's α = 0.925 and 0.827, respectively). Physical performance was the greatest perceived benefit (Avg ±SD) (3.25 ±0.06) and social interaction (2.82 ±0.08) was the lowest benefit (Table 2).

Physical exertion ranked as the highest barrier (2.39 ±0.2) and exercise milieu (1.9 ±0.14) as the lowest (Table 3). "Exercise tires me" (2.64 ±0.8) and "My family members do not encourage me to exercise" (2.34 ±0.9) (Table 3) ranked as top barriers.

Perceived benefits of exercise associated with age and depression level

There were no significant differences in BMI (p=0.853), depression (p=0.627), or activity levels (p=0.210) between the two age groups. Older women perceived significantly greater benefits of exercise compared to younger women (younger: 3.07 ±0.19, older: 3.21 ±0.18; p=0.006) (Table 2). Physical performance (younger: 3.17 ±0.07, older: 3.32 ±0.09; p=0.003) and preventive health (younger: 3.07 ±0.06, older: 3.21 ±0.2; p=0.027) ranked significantly higher among the older women. "Exercising improves the functioning of my cardiovascular system" ranked significantly higher in the older women (younger: 3.08 ±0.6, older: 3.42 ±0.58; p=0.044).

There were no differences in age ($p=0.349$), BMI ($p=0.583$), or activity levels ($p=0.421$) between the two depression groups. Women with higher CES-D scores perceived greater benefits to exercise (Low: 3.05 ± 0.05 , High: 3.25 ± 0.2 ; $p<0.001$). Women with higher CES-D scores ranked life enhancement (Low: 3.07 ± 0.1 , High: 3.21 ± 0.1 ; $p=0.029$), physical performance (Low: 3.16 ± 0.04 , High: 3.36 ± 0.1 ; $p<0.001$), psychological outlook (Low: 3.13 ± 0.09 , High: 3.29 ± 0.13 ; $p=0.032$), and preventive health (Low: 3.01 ± 0.05 , High: 3.44 ± 0.19 ; $p=0.019$) higher than women with lower CES-D scores.

Perceived barriers to exercise associated with age and depression level

There were no significant differences in barriers associated with age or depression level (Table 3). Both age groups ranked physical exertion as the greatest barrier. The statement "Exercise tires me" was ranked as the highest perceived barrier in both age groups (Table 3). Both depression groups ranked physical exertion as the greatest barrier. The statement "Exercise tires me" was ranked as the highest perceived barrier in both depression groups.

Discussion

Determining perceived benefits/barriers to exercise can be useful in the development of interventions. Physical exertion and family discouragement were reported as the largest barriers to exercise (Table 3). Older participants reported more overall agreement with the benefits scale (Table 2). Both age groups ranked physical exertion as the greatest barrier to exercise (Table 3). Participants with higher CES-D scores reported more overall agreement with the benefits scale (Table 2).

At least one study has described barriers to PA in PLWH in South Africa (Roos, Myezwa, & van Aswegen, 2015). Similar to our results, physical complaints such as being tired or having low energy levels were identified as barriers to PA (Roos et al., 2015). Reduced VO₂peak associated with poor muscle strength has been reported in PLWH and may account for this finding (Raso et al., 2013). Past exercise experiences with exercise (e.g. exercising at the wrong intensity leading to failure to complete the task and loss of motivation) may also explain this perceived barrier. Self-efficacy, or the belief that one can successfully complete a task, is a core element of Social Cognitive Theory (Young et al., 2014). Strategies that can be used to overcome this barrier include modifying frequency, intensity, time, type of exercise to levels that are appropriate for the current fitness level. Lack of family support could be overcome by building a social support system with like-minded people. Interestingly, social interaction was perceived as the lowest benefit in all of our analyses. Building this as a benefit in targeted physical activity interventions could help to counteract the perceived lack of family support. Family encouragement was identified as a facilitator of exercise in a previous study (Roos et al., 2015). In the Roos study, participants were part of an exercise program while our participants were not. Perhaps our participants would have a different perception of family support if they had been participating in an exercise program.

This study has several limitations. Most of our participants were from the Jackson, MS, metropolitan area, so the results are likely not generalizable to more rural populations. Our study was cross-sectional and data were mostly collected during the fall/winter months. We do not know if our results would differ had data been collected at a different time of the year.

Our sample size was also small, predominantly obese and African American which limits the generalizability of the findings. Finally, we did not collect information on HIV/depression diagnoses or antiretrovirals which could impact our results. Future studies may look at perceived exercise benefits/barriers based on these clinical parameters.

PLWH should be encouraged to start and maintain an exercise program. Understanding perceived barriers to exercise can facilitate the design of these programs.

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References

- Bacon MC, von Wyl V, Alden C, Sharp G, Robison E, Hessol N, Young MA. The Women's Interagency HIV Study: an observational cohort brings clinical sciences to the bench. *Clinical and Diagnostic Laboratory Immunology*. 2005; 12(9):1013–1019. [PubMed: 16148165]
- Bai Y, Welk GJ, Nam YH, Lee JA, Lee JM, Kim Y, Dixon PM. Comparison of Consumer and Research Monitors under Semistructured Settings. *Medicine and Science in Sports and Exercise*. 2015
- Bopp CM, Phillips KD, Fulk LJ, Dudgeon WD, Sowell R, Hand GA. Physical activity and immunity in HIV-infected individuals. *AIDS Care*. 2004; 16(3):387–393. [PubMed: 15203431]
- Centers for Disease, C., & Prevention. Subpopulation estimates from the HIV incidence surveillance system--United States, 2006. *MMWR Morbidity and Mortality Weekly Report*. 2008; 57(36):985–989. [PubMed: 18784639]
- Cochran SD, Mays VM. Depressive distress among homosexually active African American men and women. *American Journal of Psychiatry*. 1994; 151(4):524–529. [PubMed: 8147449]
- Desai M, Joyce V, Bendavid E, Olshen RA, Hlatky M, Chow A, Owens DK. Risk of Cardiovascular Events Associated With Current Exposure to HIV Antiretroviral Therapies in a US Veteran Population. *Clinical Infectious Diseases*. 2015; 61(3):445–452. [PubMed: 25908684]
- Dolan SE, Frontera W, Librizzi J, Ljungquist K, Juan S, Dorman R, Grinspoon S. Effects of a supervised home-based aerobic and progressive resistance training regimen in women infected with human immunodeficiency virus: a randomized trial. *Archives of Internal Medicine*. 2006; 166(11): 1225–1231. [PubMed: 16772251]
- Ezema CI, Onwunali AA, Lamina S, Ezugwu UA, Amaeze AA, Nwankwo MJ. Effect of aerobic exercise training on cardiovascular parameters and CD4 cell count of people living with human

- immunodeficiency virus/acquired immune deficiency syndrome: a randomized controlled trial. *Nigerian Journal of Clinical Practice*. 2014; 17(5):543–548. [PubMed: 25244260]
- Ferguson T, Rowlands AV, Olds T, Maher C. The validity of consumer-level, activity monitors in healthy adults worn in free-living conditions: a cross-sectional study. *International Journal of Behavioral Nutrition and Physical Activity*. 2015; 12:42. [PubMed: 25890168]
- Jaggers JR, Prasad VK, Dudgeon WD, Blair SN, Sui X, Burgess S, Hand GA. Associations between physical activity and sedentary time on components of metabolic syndrome among adults with HIV. *AIDS Care*. 2014; 26(11):1387–1392. [PubMed: 24861098]
- Kavanagh M, Cohn J, Mabote L, Meier BM, Williams B, Russell A, Baker B. Evolving Human Rights and the Science of Antiretroviral Medicine. *Health and Human Rights*. 2015; 17(1):E76–E90. [PubMed: 26204587]
- Lee PH, Macfarlane DJ, Lam TH, Stewart SM. Validity of the International Physical Activity Questionnaire Short Form (IPAQ-SF): a systematic review. *International Journal of Behavioral Nutrition and Physical Activity*. 2011; 8:115. [PubMed: 22018588]
- Lowther K, Selman L, Harding R, Higginson IJ. Experience of persistent psychological symptoms and perceived stigma among people with HIV on antiretroviral therapy (ART): a systematic review. *International Journal of Nursing Studies*. 2014; 51(8):1171–1189. [PubMed: 24602830]
- McGuire JL, Kempen JH, Localio R, Ellenberg JH, Douglas SD. Immune markers predictive of neuropsychiatric symptoms in HIV-infected youth. *Clinical and Vaccine Immunology*. 2015; 22(1): 27–36. [PubMed: 25355798]
- Neidig JL, Smith BA, Brashers DE. Aerobic exercise training for depressive symptom management in adults living with HIV infection. *Journal of the Association of Nurses in AIDS Care*. 2003; 14(2): 30–40. [PubMed: 12698764]
- Neto MG, Zwirter R, Brites C. A literature review on cardiovascular risk in human immunodeficiency virus-infected patients: implications for clinical management. *Brazilian Journal of Infectious Diseases*. 2013; 17(6):691–700. [PubMed: 23916459]
- Pekmez D, Marcus B, Meneses K, Baskin ML, Ard JD, Martin MY, Demark-Wahnefried W. Developing an intervention to address physical activity barriers for African-American women in the deep south (USA). *Womens Health (Lond Engl)*. 2013; 9(3):301–312. [PubMed: 23638785]
- Raso V, Shephard RJ, Casseb J, Duarte AJ, Silva PR, Greve JM. Association between muscle strength and the cardiopulmonary status of individuals living with HIV/AIDS. *Clinics (San Paulo, Brazil)*. 2013; 68(3):359–364.
- Roos R, Myezwa H, van Aswegen H. "Not easy at all but I am trying": barriers and facilitators to physical activity in a South African cohort of people living with HIV participating in a home-based pedometer walking programme. *AIDS Care*. 2015; 27(2):235–239. [PubMed: 25174986]
- Roos R, Myezwa H, van Aswegen H, Musenge E. Effects of an education and home-based pedometer walking program on ischemic heart disease risk factors in people infected with HIV: a randomized trial. *Journal of Acquired Immune Deficiency Syndromes*. 2014; 67(3):268–276. [PubMed: 25140908]
- Sechrist KR, Walker SN, Pender NJ. Development and psychometric evaluation of the exercise benefits/barriers scale. *Research in Nursing and Health*. 1987; 10(6):357–365. [PubMed: 3423307]
- Smarr KL, Keefer AL. Measures of depression and depressive symptoms: Beck Depression Inventory-II (BDI-II), Center for Epidemiologic Studies Depression Scale (CES-D), Geriatric Depression Scale (GDS), Hospital Anxiety and Depression Scale (HADS), and Patient Health Questionnaire-9 (PHQ-9). *Arthritis Care and Research (Hoboken)*. 2011; 63(Suppl 11):S454–S466.
- Tudor-Locke C, Hatano Y, Pangrazi RP, Kang M. Revisiting "how many steps are enough?". *Medicine and Science in Sports and Exercise*. 2008; 40(7 Suppl):S537–S543. [PubMed: 18562971]
- Washington WD, Banna KM, Gibson AL. Preliminary efficacy of prize-based contingency management to increase activity levels in healthy adults. *Journal of Applied Behavior Analysis*. 2014; 47(2):231–245. [PubMed: 24740477]
- Xu F, Town M, Balluz LS, Bartoli WP, Murphy W, Chowdhury PP. Prevention. Surveillance for certain health behaviors among States and selected local areas - United States, 2010. *Morbidity and Mortality Weekly Report. Surveillance Summaries*. 2013; 62(1):1–247. [PubMed: 23718989]

- Yi MS, Mrus JM, Wade TJ, Ho ML, Hornung RW, Cotton S, Tsevat J. Religion, spirituality, and depressive symptoms in patients with HIV/AIDS. *Journal of General Internal Medicine*. 2006; 21(Suppl 5):S21–S27. [PubMed: 17083496]
- Young MD, Plotnikoff RC, Collins CE, Callister R, Morgan PJ. Social cognitive theory and physical activity: a systematic review and meta-analysis. *Obesity Reviews*. 2014; 15(12):983–995. [PubMed: 25428600]

Table 1

Participant Characteristics (n=50)

Gender, female	100% (50)
Race, African American	96% (48)
Age, yrs	42 (8.8) 26–58
<u>BMI, kg/m²</u>	36.6 (11.5) 19.5–64.6
Percent ≥ 25	80% (40)
Percent ≥ 30	72% (36)
<u>CES-D Questionnaire</u>	15.6 (11.4) 0–42
Percent ≥ 16	44% (22)
<u>Self-report activity measures:</u>	
Percent reporting 0 days of:	
Vigorous exercise	84% (42)
Moderate exercise	48% (24)
<u>Activity monitor:</u>	
Steps per day	7234 (3075) 2254–16875
Percent taking >10,000 steps/day 50% of the time	16% (8)
Active minutes per week	32.5 (37.7) 1–204
Percent meeting 150 minutes of activity/week	2% (1)

Avg (SD) min-max or % (n)

Perceived Benefits by Age and Depression

Table 2

	Total	Age		p value	CES-D		p value
		<43	>=43		<16	>=16	
All Benefits	3.14 (0.17)	3.07 (0.19)	3.21 (0.18)	0.006	3.05 (0.05)	3.25 (0.2)	<0.001
<u>Life Enhancement Subscale</u>	3.13 (0.09)	3.08 (0.1)	3.18 (0.13)	0.107	3.07 (0.1)	3.21 (0.1)	0.029
My disposition is improved with exercise	3.06 (0.55)	3.04 (0.46)	3.08 (0.63)	0.824	3.04 (0.5)	3.09 (0.6)	0.729
Exercising helps me sleep better at night	3.22 (0.58)	3.25 (0.44)	3.19 (0.69)	0.73	3.14 (0.5)	3.12 (0.6)	0.294
Exercise helps me decrease fatigue	2.98 (0.59)	3.04 (0.64)	2.92 (0.56)	0.485	3.0 (0.6)	2.95 (0.6)	0.785
Exercising improves my self-concept	3.16 (0.62)	3.0 (0.66)	3.31 (0.55)	0.078	3.07 (0.7)	3.27 (0.6)	0.257
Exercising increases my mental alertness	3.2 (0.61)	3.13 (0.61)	3.27 (0.6)	0.406	3.18 (0.5)	3.23 (0.7)	0.781
Exercise allows me to carry out normal activities without becoming tired	3.26 (0.6)	3.21 (0.59)	3.31 (0.62)	0.563	3.21 (0.5)	3.32 (0.7)	0.549
Exercise improves the quality of my work	3.1 (0.68)	3.04 (0.81)	3.15 (0.54)	0.564	3.0 (0.7)	3.23 (0.7)	0.243
Exercise improves overall body functioning for me	3.08 (0.63)	2.92 (0.65)	3.23 (0.59)	0.08	2.93 (0.6)	3.27 (0.6)	0.056
<u>Physical Performance Subscale</u>	3.25 (0.06)	3.17 (0.07)	3.32 (0.09)	0.003	3.16 (0.04)	3.36 (0.1)	<0.001
Exercise increases my muscle strength	3.28 (0.57)	3.25 (0.53)	3.31 (0.62)	0.726	3.21 (0.4)	3.36 (0.7)	0.366
Exercising increases my level of physical fitness	3.34 (0.75)	3.21 (0.83)	3.46 (0.65)	0.234	3.18 (0.8)	3.55 (0.7)	0.084
My muscle tone is improved with exercise	3.16 (0.55)	3.08 (0.5)	3.23 (0.59)	0.347	3.14 (0.4)	3.18 (0.7)	0.806
Exercising improves the functioning of my cardiovascular system	3.26 (0.6)	3.08 (0.6)	3.42 (0.58)	0.044	3.11 (0.6)	3.45 (0.6)	0.041
Exercise increases my stamina	3.22 (0.58)	3.13 (0.61)	3.31 (0.55)	0.272	3.14 (0.5)	3.32 (0.6)	0.295
Exercising improves my flexibility	3.3 (0.5)	3.29 (0.46)	3.31 (0.55)	0.912	3.21 (0.4)	3.41 (0.6)	0.178
My physical endurance is improved by exercising	3.18 (0.66)	3.17 (0.56)	3.19 (0.75)	0.893	3.14 (0.5)	3.23 (0.8)	0.658
Exercise improves the way my body looks	3.26 (0.72)	3.17 (0.8)	3.35 (0.63)	0.386	3.14 (0.7)	3.41 (0.8)	0.199
<u>Psychological Outlook Subscale</u>	3.2 (0.1)	3.15 (0.15)	3.24 (0.1)	0.217	3.13 (0.09)	3.29 (0.13)	0.032
I enjoy exercise	3.0 (0.57)	2.88 (0.61)	3.12 (0.52)	0.139	2.96 (0.6)	3.05 (0.5)	0.623
Exercise decreases feelings of stress and tension for me	3.2 (0.6)	3.21 (0.66)	3.12 (0.57)	0.927	3.14 (0.6)	3.27 (0.6)	0.458
Exercise improves my mental health	3.27 (0.64)	3.13 (0.76)	3.38 (0.5)	0.166	3.15 (0.6)	3.41 (0.66)	0.157
Exercise gives me a sense of personal accomplishment	3.3 (0.61)	3.25 (0.67)	3.35 (0.56)	0.586	3.21 (0.6)	3.41 (0.6)	0.27
Exercising makes me feel relaxed	3.24 (0.56)	3.29 (0.46)	3.19 (0.63)	0.533	3.18 (0.5)	3.32 (0.6)	0.383
I have improved feelings of well being from exercise	3.18 (0.56)	3.13 (0.45)	3.23 (0.65)	0.51	3.11 (0.4)	3.27 (0.7)	0.304

		Age			CES-D		
	Total	<43	>=43	p value	<16	>=16	p value
<u>Social Interaction</u>							
Exercising lets me have contact with friends and persons I enjoy	2.82 (0.08)	2.73 (0.2)	2.89 (0.2)	0.337	2.72 (0.2)	2.93 (0.2)	0.218
Exercising is a good way for me to meet new people	2.78 (0.86)	2.63 (0.87)	2.92 (0.84)	0.226	2.64 (0.8)	2.95 (0.9)	0.209
Exercise is good entertainment for me	3.04 (0.72)	2.92 (0.72)	3.15 (0.73)	0.253	2.96 (0.7)	3.14 (0.8)	0.412
Exercising increases my acceptance by others	2.9 (0.68)	2.92 (0.65)	2.88 (0.71)	0.869	2.82 (0.6)	3.0 (0.76)	0.36
Preventive Health Subscale	2.54 (0.71)	2.46 (0.66)	2.62 (0.75)	0.437	2.46 (0.7)	2.64 (0.7)	0.398
I will prevent heart attacks by exercising	3.2 (0.09)	3.07 (0.06)	3.21 (0.2)	0.027	3.01 (0.05)	3.44 (0.19)	0.019
Exercising will keep me from having high blood pressure	3.1 (0.7)	3.0 (0.72)	3.19 (0.7)	0.342	3.0 (0.5)	3.23 (0.9)	0.264
I will live longer if I exercise	3.26 (0.72)	3.13 (0.8)	3.38 (0.64)	0.208	3.07 (0.7)	3.5 (0.67)	0.036
Shown are Avg (SD)	3.24 (0.74)	3.08 (0.8)	3.38 (.07)	0.155	2.96 (0.7)	3.59 (0.6)	0.002

Table 3

Perceived Barriers by Age and Depression

	Total	Age		p value	CES-D		p value
		<43	≥43		<16	≥16	
All Barriers	2.06 (0.25)	2.09 (0.2)	2.04 (0.3)	0.596	2.0 (0.2)	2.14 (0.3)	0.178
<u>Exercise Milieu Subscale</u>	1.90 (0.14)	1.94 (0.2)	1.86 (0.14)	0.439	1.88 (0.16)	1.93 (0.12)	0.542
Places for me to exercise are too far away	2.14 (0.78)	2.21 (0.83)	2.08 (0.7)	0.558	2.14 (0.9)	2.14 (0.6)	0.977
I am too embarrassed to exercise	1.72 (0.86)	1.71 (0.86)	1.73 (0.87)	0.928	1.68 (0.8)	1.77 (0.9)	0.704
It costs too much to exercise	1.88 (0.82)	1.79 (0.9)	1.96 (0.77)	0.472	1.86 (0.76)	1.91 (0.9)	0.828
Exercise facilities do not have convenient schedules for me	1.92 (0.7)	1.96 (0.7)	1.88 (0.71)	0.712	1.89 (0.8)	1.95 (0.57)	0.759
I think people in exercise clothes look funny	1.9 (0.8)	2.13 (0.9)	1.69 (0.62)	0.052	1.93 (0.7)	1.86 (0.9)	0.776
There are too few places for me to exercise	1.86 (0.78)	1.88 (0.68)	1.85 (0.88)	0.898	1.79 (0.6)	1.95 (0.9)	0.455
<u>Time Expenditure Subscale</u>	1.97 (0.17)	2.01 (0.12)	1.94 (0.26)	0.658	1.94 (0.2)	2.02 (0.15)	0.626
Exercising takes too much of my time	2.16 (0.8)	2.08 (0.83)	2.23 (0.76)	0.516	2.14 (0.76)	2.18 (0.85)	0.865
Exercise takes too much time from family relationships	1.84 (0.62)	1.88 (0.54)	1.81 (0.7)	0.705	1.75 (0.65)	1.95 (0.57)	0.249
Exercise takes too much time from my family responsibilities	1.92 (0.8)	2.08 (0.82)	1.77 (0.7)	0.156	1.93 (0.86)	1.91 (0.68)	0.931
<u>Physical Exertion Subscale</u>	2.39 (0.2)	2.35 (0.2)	2.42 (0.28)	0.73	2.3 (0.27)	2.5 (0.2)	0.375
Exercise tires me	2.64 (0.8)	2.54 (0.7)	2.73 (0.87)	0.41	2.57 (0.7)	2.73 (0.9)	0.501
I am fatigued by exercise	2.24 (0.8)	2.13 (0.8)	2.35 (0.8)	0.354	2.04 (0.8)	2.5 (0.7)	0.044
Exercise is hard work for me	2.28 (0.8)	2.38 (0.6)	2.19 (0.9)	0.416	2.3 (0.7)	2.27 (0.9)	0.954
<u>Family Discouragement Subscale</u>	2.2 (0.2)	2.27 (0.1)	2.13 (0.24)	0.57	2.02 (0.2)	2.43 (0.2)	0.178
My spouse (or significant other) does not encourage exercising	2.06 (0.8)	2.17 (0.76)	1.96 (0.8)	0.366	1.89 (0.6)	2.27 (0.9)	0.093
My family members do not encourage me to exercise	2.34 (0.9)	2.38 (0.77)	2.31 (1.0)	0.793	2.14 (0.8)	2.59 (0.9)	0.079
Shown are Avg (SD)							