Cardiovascular risks and physical activity in middle-aged and elderly African-American women.

By: Patricia B. Crane and Debra C. Wallace

Crane, P. B., & Wallace, D. C. (2007). Cardiovascular risks and physical activity in middle-aged and elderly African-American women. Journal of Cardiovascular Nursing, 22(4), 297-301.

Abstract:

Cardiovascular disease rates are higher in African American women and they have more cardiovascular risk factors than other groups. Although one of the most important cardiovascular risk reduction behaviors is physical activity, few studies have focused on African American women's cardiovascular risk and physical activity. Therefore, the aims of this descriptive pilot study were to describe modifiable cardiovascular risks and to explore physical activity, as measured by pedometer steps, in younger (n = 22; aged 21-45 years) and older (n = 22; aged 46-75 years) community-dwelling African American women. The total number of pedometer steps recorded in 3 days ranged from 1,153 to 52,742. Day 1 steps were significantly different than day 2 and day 3 steps across the sample ($F = 5.30$, $df = 1$, $P < .05$). Risk factors were similar across the age groups. There was no relationship between the 3-day total or average number of daily steps and cardiovascular risks. Thus, interventions may be used in both age groups, with modifications for cohort effects of approach and health status. Given the disparities in cardiovascular disease and the Healthy People 2010 national health objectives, it is important to continue a variety of efforts to assist adult women of all ages to increase their physical activity and to decrease other CVD risks.

Keywords: cardiovascular disease | African American women | cardiovascular risk factors | physical activity | middle-aged women | older adults | nursing | cardiovascular nursing

Article:

The authors acknowledge partial support from the Associate Provost for Research Office and assistance of K. Boss, J. Lutz, J. McNeil, S. Colaner, and D. Chaffee.

Corresponding author Patricia B. Crane, PhD, RN, FAHA, UNCG School of Nursing, Room 220 Moore, N. Extension Drive, Greensboro, NC 27402 (e-mail: pbcrane@uncg.edu).

Cardiovascular disease (CVD) is the number 1 cause of death in the United States.1 Unfortunately, higher mortality and the burden of risk for CVD falls more heavily on the elderly and those of African American (AA) descent.1,2 African American women have the highest percentage of CVD compared with white or Mexican American women.1 Strategies to decrease risk in AA women, especially older women, are important. It is unclear, however, if strategies targeting risk factors should be different for young to middle-aged and elderly groups of AA women. Therefore, the purpose of this study was to examine cardiovascular risks and participation in physical activity in middle-aged and elderly AA women.

Cardiovascular Risks

Major modifiable CVD risk factors include smoking, hypertension, obesity, and physical inactivity.1,3 A study 4 revealed that approximately 90% of women who presented for a free CVD risk screening without a known history of CVD had at least 1 major modifiable risk factor, and approximately 33% had at least 3. Further, AAs have the highest prevalence of 2 or more risk factors.5 In addition, aging is associated with a higher incidence of diabetes, hypertension, and high cholesterol levels in women compared with men.3 Because North Carolina is 1 of 12 states with 40% or more of the population reporting multiple cardiac risk factors,5 investigation of CVD risks in AA women in this state is particularly salient.

Smoking

The prevalence of smoking increases with age.1 Although a higher percentage of white women smoke than AA women at younger ages and most of those who smoke begin prior to age 18, AA women begin smoking later.6 Higher prevalence of smoking is noted in those with lower incomes.1,7 Because AA women begin smoking later than other racial groups, and there is a strong association of smoking to heart disease and stroke,1 examining smoking as a cardiac risk factor in AA women, both middle-aged and older age groups, is essential.

Hypertension

One of the most common CVD risk factors in the older adult and AA populations is hypertension. Hypertension is more prevalent in women compared with men. A recent analysis of the National Health and Nutrition Examination Survey (NHANES) III 8 noted the prevalence of hypertension increased approximately 30% from 1999 to 2000, totaling approximately 65 million Americans: 5 million AA women and 17 million elderly. The risk of hypertension and CVD for women increases with age as women lose the protective advantage gained prior to menopause, whereas the risk to men increases less rapidly as they age. In addition, elderly women, especially AA women in the rural south, find it particularly difficult to control hypertension, due in part to costs, side effects, medical care disparities, nutritional culture, and socioeconomic status.7,9

Obesity

Obesity, defined as a body mass index of 30 or higher, has increased by 12% in the United States since 1997 10 and has been associated with $31 billion of treatment costs for coronary vascular disease.11 African American women are more often overweight or obese than other racial groups.6,7,12 A higher percentage of women compared with men aged 60 years and older are obese. A recent study 4 noted that when a woman's waist circumference exceeded 35 inches, there was a significant correlation with increased risk of systolic hypertension (OR = 1.89; $P < .001$). High waist circumference also was significantly associated with high total cholesterol, diabetes, and CVD. Because obesity is associated with other comorbid conditions, such as diabetes, hypertension, and hypercholesterolemia, it is difficult to identify an independent effect of obesity on heart disease.10,13,14 Nevertheless, the "burden of major cardiovascular risk factors is substantially greater in the obese."13(p566) In a review of cardiovascular risk factors among participants 65 years and older in the Framingham Study, Kannel reported that 1 standard deviation increase in weight increased the rate of CVD by 25% in women and by 15% in men.13

Physical Inactivity

Most Americans are not active to the level currently recommended by the Centers for Disease Control to prevent morbidity and mortality from CVD and other chronic diseases.15 Physical

inactivity increases with age and is more prevalent in women than in men.15 Southern, rural, AA women are the least likely group to be active, with over 50% reporting physical inactivity.7 This is of concern because the risk of developing heart disease is 1.5 to 2.4 times higher in the physically inactive, a risk equal to that of high blood pressure, cholesterol, and smoking.1 Therefore, one of the most effective methods to reduce cardiac risk is participation in regular physical activity.

Increasing physical activity can affect other risk factors. For example, physical activity alters fat metabolism, thus improving lipid profiles and also modifying obesity. Yet, over 60% of women are not participating in the recommended amount of physical activity,1,16 with AA women having the lowest prevalence of participation in physical activity.12

In examining correlates of physical activity in women in 91 studies, few studies included AA or Hispanic women.17 Of the studies targeting minority women, physical activity did not significantly increase with community intervention,18 minority women perceive many barriers to physical activity,19 sedentary women did not meet the recommended levels of activity,20,21or patterns of activity were inconsistent.22 Further research is needed to determine factors associated with physical inactivity and to determine whether inactivity is similar across age groups of AA women.

Recording Physical Activity

Speck and Looney 23 conducted a study to assess the influence of daily recording of physical activity. The goal was to increase physical activity in working women (aged 20-57 years). Although results indicated that daily recording increased physical activity, most women (86%) in this study were white. A prospective study of women (N = 72,488) 40 to 65 years indicated that brisk walking resulted in the reduction of coronary events with an effect similar to that seen with vigorous exercise.24 Other investigators have noted the beneficial effect of physical activity on CVD.25,26 Others 27 noted that the time spent walking (1 hour of walking each week), not the pace of walking, was associated with lower risk for CVD in women. However, there is concern that the recommended 10,000 steps per day is too high for sedentary women and does not necessarily correlate with 30 minutes of moderate-intensity exercise.28,29 Few studies have

compared self-reported physical activity and the use of a step pedometer as a mechanism to increase awareness of physical activity, thus reinforcing participation. Because pedometers accurately measure distance walked 30 and can serve as a demanding behavioral target in sedentary women 30 to 55 years,29 further research to test the effect of using a step pedometer to reinforce physical activity in older AA women is useful.

Few studies regarding physical activity have specifically addressed women 31 or the elderly and even fewer investigated AA women. Focusing attention on this population is imperative to understanding AA women's participation in cardiovascular risk reduction. Therefore, the aims of this pilot study were to describe modifiable cardiovascular risks and to explore the relationship of physical activity and risk in younger and older community-dwelling AA women. The research questions were: (a) What is the amount of physical activity engaged in by young to middle-aged and older AA women?; (b) Do young to middle-aged AA women differ from elderly AA women in the proportion of modifiable risk factors of smoking, hypertension, obesity, and physical inactivity?; and (c) Is there an association between self-reported physical activity and other modifiable risk factors in the 2 age groups of AA women?

Methods

Sample and Setting

For this descriptive pilot study, a convenience sample (N = 44) of AA women ranging in age from 21 to 45 years (n = 22) and 46-75 (n = 22) from communities in the south was recruited. The counties in this area include both rural and small city urban areas, minimal or no mass transportation, and an average 30% minority population. Inclusion criteria included: (a) AA woman, (b) ages between 21 and 75 years, (c) community dwelling, and (d) English speaking. Women were categorized into 2 age groups consistent with large national health surveys: younger women 21 to 45 years and older women 46 to 75 years. This categorization was used to ascertain initial trends and CVD risks and to explore if they were different, and thus, would require different strategies to foster cardiovascular health. Women were recruited by personal contact through churches, worksites, beauty salons, and social organizations. Flyers were posted in community settings with contact information. A lay recruiter was used to inform potential participants of the study, to ascertain their interest, and to obtain their contact information. Research assistants contacted women interested in participating to explain the study, answer questions, screen for eligibility, and schedule a convenient time to collect data. After each

woman completed the informed consent, the researchers assisted them in completing the questionnaires and collecting biophysical markers.

Measures and Data Collection Procedures

The Demographic and Health Survey Questionnaire (DHS) was designed to measure demographic variables and to obtain a brief health history and personal knowledge of health behaviors. Basic demographic questions such as age, marital status, education, and questions related to health history and personal knowledge of health behaviors were used. Health history questions centered on risks, including diagnosis or family history of hyperlipidemia, hypertension, diabetes, previous myocardial infarction or stroke, and medication use. For example, participants were asked if they had elevated blood sugar and, if so, whether they were taking medications for the condition. Health items queried women's response to such questions as, "Has your physician or healthcare provider ever told you that you have high blood pressure?" or "Do you desire to increase your physical activity?" To increase reliability and minimize barriers in comprehension related to reading or educational level, all questions were read to the participants if needed. The DHS included 37 questions similar to Bureau of Census, Behavioral Risk Factor Surveillance Survey, and NHANES items, and took approximately 15 minutes to complete.

Standard clinical procedures were used to obtain systolic and diastolic blood pressures measurements with a manual sphygmomanometer in a sitting position. Height was measured using a portable stadiometer, the seco 214 Road Rod. Weight was measured in kilograms using a Tanita BWB-Series Digital Professional Body Weight Scale, which has a capacity up to 200 kg with an accuracy of 0.05 kg and an internal mechanism that recalibrates zero point at each use. Central obesity was measured with a standard Gantt tape measure at the waist with clothes removed while subjects were standing. Determinants of risk and cutoff scores published by the National Heart, Lung, and Blood Institute and The National Cholesterol Education were used for risk assessment.

To measure physical activity, women were asked to wear an Eagle AE 120 pedometer by Accusplit and to daily audio-record and write the number of steps noted on the pedometer for 3 consecutive days. Recent research indicates that any 3-day collection of pedometer monitoring provides a reliability of 0.80 and that there is no practical difference on which day of the week the pedometer is worn.32 Each woman was instructed to wear the pedometer on the waistband over the thigh following manufacturer recommendations, and to wear the pedometer for 3 consecutive days during waking hours. Each woman then completed a return demonstration. Telephone numbers of the researchers were also provided for additional questions. In addition to the pedometer for measuring physical activity, there were 5 items on the DHS that asked women about their prior physical activity, as well as the type and amount of time spent in the activity. A final question asked if women desired to participate in or increase their physical activity.

Institutional Review Board approval was obtained from the university prior to beginning the study and all team members completed Department of Health and Human Services Protection of Human Subjects certification. At the end of the 3 days, each woman received a $10.00 Wal-Mart gift card as a token of appreciation for participating in the study.

Data Analyses

Using SPSS 11.5, the researchers used frequency distributions, means, and standard deviations, as appropriate, to characterize the sample based on demographic variables. Research question 1 was answered using 1-way analysis of variance. Research question 2 was answered using independent t tests to determine differences in the 2 age groups on interval-level risk variables and using [chi]2 to detect difference on categorical variables. Research question 3 was answered using Phi and Pearson correlation coefficients appropriate to the level of variable measurement. Alpha level was set at .05 for all tests.

Results

The mean age of the sample was 48.59 (SD = 11.34). Ages of the women ranged from 26 to 74 years (see Table 1). Most of the women were married (48%), had a high school education or more (93%), and reported combined annual incomes of $40,000 or less (56%). A third of each

group lived in rural areas. Thirty-one percent took "water" pills. Only 16% reported taking cholesterol-lowering medication, whereas 84% reported taking antihypertensive medication.

Physical Activity

The largest proportion of women walked (37%) for 30 minutes (49%) 3 times a week (46%). The amount of total steps recorded in 3 days ranged from 1,153 to 52,742 (M = 16,325; SD = 12,583). After removing the outliers, analysis indicated that day 1 steps were significantly different than day 2 and day 3 steps across the sample ($F = 5.30$, $df = 1$, $P < .05$). Average number of steps per day increased for older women from 4,007 on day 1 to 6,465 on day 3 (see Figure 1). The younger women had an increase from day 1 (5,728) to day 3 (6,353), but this was not as large a proportion increase as seen in the older women, perhaps because they started with more steps initially. With respect to the total steps for the 3 days, the older women's steps ranged from 1,152 to 52,742 (M = 16,325; SD = 12,583), and the younger women had a smaller range of total steps: 2,856 to 38,616 (M = 17,832; SD = 10,478). There was no significant difference in the 3-day total or average number of daily steps between the 2 age groups. All of the middle-aged group and 91% of the older age group indicated a desire to increase their physical activity.

Cardiac Risk Factors by Age Group

Table 2 delineates the proportion of modifiable and nonmodifiable cardiac risk factors in each age group. The young to middle-aged women had several risk factors in common. More than 30% of each group had been told they suffered from high cholesterol and more than 60% had been told by a healthcare provider that they had high blood pressure. The younger women's systolic blood pressure averaged 130.10 mm Hg (SD = 16.37) and the older women averaged 126.10 mm Hg (SD = 15.59). Diastolic pressure was similar in older women (M = 76.10, SD = 9.936) and younger women (M = 76.76 SD = 8.93). Many of the women would be classified as hypertensive by the ATP III guidelines.33

Graphic Table 2

Only 1 woman currently smoked, but 3 in the younger group and 7 in the older group had smoked during their lifetime. More than half in each group lived with persons who smoked. Obesity was a concern, as validated by several indicators. Body mass index was high in both groups, and the proportion of women who were obese was greater in the younger group, although this was not a significant difference. Waist circumference was larger than recommended for both the younger (M = 97.52 cm; SD = 15.64) and older women (M = 94.21

cm, SD = 14.82). Finally, the waist risk for metabolic syndrome (>88 cm) was higher in the young to middle-age group than the older women, although not significantly.

Nonmodifiable risk factors were also present in both age groups. Sixty-nine percent of the older women had a maternal family history of CVD or diabetes, and 76% of the younger women also had this history. A majority also had paternal family history. Surprisingly, only 1 woman was diabetic. A final risk factor revealed that more than half of the older women had experienced a hysterectomy, with one third of the younger group with this risk.

Physical Activity and Modifiable Risk Factors

Because the groups were not different in the modifiable risk factors, the relation between physical activity and those risk factors were examined in the total sample. Physical activity was measure by 3-day step total and daily step average. Pearson and phi correlations indicate that no specific modifiable risk factor was related to total or average daily steps. Being obese was related to higher systolic ($r = 0.345$, $P < .05$) and diastolic ($r = 0.314$, $P < .05$) blood pressure. Higher waist circumference (cm) was related to higher systolic ($r = 0.370$, $P < .05$), and higher body mass index was relate to higher diastolic pressure ($r = 0.309$, $P < .05$).

Discussion

These AA women had many cardiovascular risk factors, both modifiable and nonmodifiable. Obesity, hypertension, and physical inactivity were the primary modifiable risks, and these women were representative of AA women nationally.34,35 In addition, nonmodifiable factors were high in the women, with the majority having a strong family history of CVD, diabetes, or both. Some of the CVD risks were being treated with medications, and almost all women wanted to increase their physical activity.

The low physical activity reported in this study is similar to recent findings.19-21,36 Those studies point to how and why women, especially those of varying ethnic/racial and low-income groups, do not participate in the recommended daily step counts.28 Findings suggest that the concern or question of appropriate cut points and benchmarks for adult populations may need to be reset or at least reconsidered for the many types of equivalents for 30 minutes of moderate-intensity activity set forth by the Surgeon General report and Healthy People 2010. For example, several authors 20,29,37 argue that walking steps may not accurately reflect actual physical activity by women, in particular, and that 10,000 steps may not be the most appropriate measure by itself. However, it is not yet clear what the actual benchmark should be or what percent increase from sedentary to increased activity would be the most effective to lessen CVD risk. Those decisions and new recommendations for physical activity are forthcoming from the Centers for Disease Control and other national bodies.

Cardiovascular risk factors were similar across the age groups. This is of concern especially for the young to middle-aged women. If, in fact, they are already exhibiting many risks and actual CVD effects, such as hypertension, there is urgency for interventions to prevent even worse health disparities in the next 20 to 30 years. One positive thought is that interventions can be used in both age groups, with modifications for cohort effects of approach, capability, and health status. Although similar techniques can be used, such as pedometers, stress relief, and walking to increase physical activity, approaches may vary. For example, exercising at a YWCA or church may be more culturally appropriate for older women, and worksite strategies would be more useful for young to middle-aged women. Although CVD risks may be mitigated or delayed by interventions, there are no "magic bullet" interventions for midlife 38 or AA women.18 Continued innovation and tailoring lifestyle changes and choices for high-risk groups are required.

Pedometers in this pilot study appeared to be useful as a reminder to increase physical activity in the older women. Although there are limitations to pedometers, such as not being reset to zero each day or the limitation in the measurement of intensity, the ease of use for all age and literacy level group is appealing as a generic physical activity measure,39 especially when coupled with verbal or written records. In addition, clear and repeated return demonstration by participants is necessary to plan for the time, costs, validity, and cultural appropriateness of the study. It would be important to consider other devices, such as accelerometers, and their usefulness and

appropriateness for research versus day-to-day monitoring and prevention efforts.22,37

In future studies, it is important to look at similar groups of AA women to ascertain whether their needs for intervention and lifestyle change can be understood, and their motivation to lower risks can be enhanced. This is especially true for the modifiable risks that have been previously related to lower physical activity.40,41 The recent national study on women's awareness provides an excellent starting point for that work.42 Also, programs such as WISEWOMAN,43 Heart Truth,35 and WomenHeart44 provide promise to empower, embolden, and encourage these women to increase their physical activity for health and well-being, including avoiding the complications and the sequelae of CVD.45 For providers, this includes conducting a comprehensive assessment of health, lifestyle, and family risk recommended by the AHA Evidence Based Guidelines for CVD Prevention in Women 46 and metabolic syndrome risks in the ATP III guidelines,33 and sharing this information with the women. Given the disparities in CVD and the Healthy People 2010 national health objectives, it is important to continue a variety of efforts to assist AA adult women of all ages to improve their physical activity and decrease their cardiovascular risks.

REFERENCES

American Heart Association. Physical activity and cardiovascular health fact sheet. 2006. Available at: http://www.americanheart.org/presenter.jhtml. Accessed November 11, 2006.

Casper ML, Barnett E, Halverson JA, et al. Women and Heart Disease: An Atlas of Racial and Ethnic Disparities in Mortality. 2nd ed. Greensburg, Pa: Centers for Disease Control and Prevention; 2000.

Kannel WB, Levine BS. Coronary heart disease risk in people 65 years of age and older. Prog Cardiovasc Nurs. 2003;18:135-140.

Mosca L, Edelman D, Mochari H, Christian AH, Paultre F, Pollin I. Waist circumference predicts cardiometabolic and global Framingham risk among women screened during National Women's Heart Day. J Women's Health. 2006;15:24-34.

Centers for Disease Control. Racial/ethnic and socioeconomic disparities in multiple risk factors for heart disease and stroke-United States, 2003. Morbid Mortal Wkly Rep. 2005;54:113-140.

Centers for Disease Control. Minority women's health: health problems in African American women. 2006. Available at: http://www.4woman.gov/minority/africanamerican/smoking.cfm. Accessed August 17, 2006.

Harrell JS, Gore SV. Cardiovascular risk factors and socioeconomic status in African American and Caucasian women. Res Nurs Health. 1998;21:285-295.

Fields LE, Burt VL, Cutler JA, Hughes J, Roccella EJ, Sorlie P. The burden of adult hypertension in the United States 1999 to 2000: a rising tide. Circulation. 2004;44:398-404.

Appel SJ, Giger JN, Davidhizar RE. Opportunity cost: the impact of contextual risk factors on the cardiovascular health of low-income rural southern African American women. J Cardiovasc Nurs. 2005;20:315-324.

U.S. Department of Health and Human Services, Health Resources and Services Administration, Maternal and Child Health Bureau. Women's Health USA 2002. Rockville, Md: US Department of Health and Human Services; 2002.

American Heart Association. Heart Disease and Stroke Statistics-2003 Update. Dallas, Tex: American Heart Association; 2002.

McGuire LC, Ahluwalia IB, Strine TW. Chronic disease-related behaviors in U.S. older women: behavioral risk factor surveillance system. J Women's Health. 2006;15:3-7.

Kannel WB. Cardiovascular risk factors in the elderly. Coron Artery Dis. 1997;8:565-575.

Corrao JM, Becker RC, Ockene IS, Hamilton GA. Coronary heart disease risk factors in women. Cardiology. 1990;77(suppl 2):8-24.

Centers for Disease Control. Physical activity: selected U.S. national research findings. 2006. Available at: http://www.cdc.gob/women/natstat/phyact.htm. Accessed January 3, 2007.

US Department of Health and Human Services, Health Resources and Services Administration, Maternal and Child Health Bureau. Women's Health USA 2005. Rockville, Md: US Department of Health and Human Services; 2005.

Eyler AE, Wilcox S, Matson-Koffman D, et al. Correlates of physical activity among women from diverse racial/ethnic groups. J Women's Health Gend-Based Med. 2002;11:239-253.

Banks-Wallace J, Conn V. Interventions to promote physical activity among African American women. Public Health Nurs. 2002;19:321-335.

Henderson KA, Ainsworth BE. Enablers and constraints to walking for older African American and American Indian women: the cultural activity participation study. Res Q Exerc Sport. 2000;71:313-321.

Jordan AN, Jurca GM, Tudor-Locke C, Church TS, Blair SN. Pedometer indices for weekly physical activity recommendations in postmenopausal women. Med Sci Sports Exerc. 2005;37:1627-1632.

Sidman CL, Corbin CB, LeMasurier G. Promoting physical activity among sedentary women using pedometers. Res Q Exerc Sport. 2004;75:122-129.

Whitt M, Kumanyika S, Bellamy S. Amount and bouts of physical activity in a sample of African-American women. Med Sci Sports Exerc. 2003;35:1887-1893.

Speck BJ, Looney SW. Effects of a minimal intervention to increase physical activity in women: daily activity records. Nurs Res. 2001;50:374-378.

Manson JE, Hu FB, Rich-Edwards JW, et al. A prospective study of walking as compared with vigorous exercise in the prevention of coronary heart disease in women. N Engl J Med. 1999;341:650-658.

Moreau KL, Degarmo R, Langley J, et al. Increasing daily walking lowers blood pressure in postmenopausal women. Med Sci Sports Exerc. 2001;33:1825-1831.

Lee IM, Sesso HD, Oguma Y, Paffenbarger RS. Relative intensity of physical activity and risk of coronary heart disease. Circulation. 2003;107:1110-1116.

Lee IM, Rexrode KM, Cook NR, Manson JE, Buring JE. Physical activity and coronary heart disease in women: is "no pain, no gain" passe'? JAMA. 2001;285:1447-1454.

Tudor-Locke C, Bassett DR. How many steps/day are enough? Preliminary pedometer indices for public health. Sports Med. 2004;34:1-8.

Wilde BE, Sidman CL, Corbin CB. A 10,000 step count as a physical activity target for sedentary women. Res Q Exerc Sport. 2001;72:411-414.

Bassett DR, Ainsworth BE, Leggett SR, et al. Accuracy of five electronic pedometers for measuring distance walked. Off J Am Coll Sports Med. 1996;28:1071-1077.

Krummel DA, Matson-Koffman D, Bronner Y, et al. Cardiovascular health interventions in women: what works? J Women's Health Gend-Based Med. 2001;10:117-136.

Tudor-Locke C, Burkett L, Reis JP, Ainsworth BE, Macer CA, Wilson DK. How many days of pedometer monitoring predict weekly physical activity in adults? Prev Med. 2005;40:293-298.

National Cholesterol Education Program (NCEP) Expert Panel. The report of the National Cholesterol Education Program (NCEP) expert panel on detection, evaluation and treatment of high blood cholesterol in adults (ATPIII) final report. Circulation. 2002;106:3143.

American Obesity Association. Obesity in Minority Populations. 2002. Available at: http://www.obesity.org/subs/advocacy/AOA_HP2010.shtml. Accessed January 3, 2007.

National Heart Lung and Blood Institute. The heartTruth: a national awareness campaign for women about heart disease. 2006. Available at: http://www.nhlbi.nih.gob/health/hearttruth/. Accessed December 20, 2006.

Bennett GG, Wolin KY, Viswanath K, Askew S, Puleo E, Emmons KM. Television viewing and pedometer-determined physical activity among multiethnic residents of low-income housing. Res Pract. 2006;96:1681-1685.

Berlin JE, Storti KL, Brach JS. Using activity monitors to measure physical activity in free-living conditions. Phys Ther. 2006;86:1137-1145.

Wilbur J, Miller AM, McDevitt J, Wang E, Miller J. Menopausal status, moderate-intensity walking, and symptoms in midlife women. Res Theory Nurs Pract. 2005;19:163-180.

Tudor-Locke C, Ainsworth BE, Thompson WW, Matthews CE. Comparison of pedometer and accelerometer measures of free living physical activity. Med Sci Sports Exerc. 2002;34:2045-2051.

Bryant SA, Neff-Smith M. Risk factors and intervention for obesity in African-American women. J Multicult Nurs Health. 2001;7:54-56.

Young DR, Aickin M, Brantley P, et al. Physical activity, cardiorespiratory fitness, and their relationship to cardiovascular risk factors in African-American and non African-Americans with above optimal blood pressure. J Community Health. 2005;30:107-118.

Mosca L, Mochari H, Christian A, et al. National study of women's awareness, preventive action, and barriers to cardiovascular health. Circulation. 2006;113:525-534.

Centers for Disease Control. WISEWOMEN: well-integrated screening and evaluation for women across the nation. 2006. Available at: http://www.cdc.gov/wisewomen/. Accessed September 1, 2006.

National Coalition for Women's Heart Disease. WomenHeart. 2006. Available at: http://womenheart.org/. Accessed August 1, 2006.

Crane PB. Fatigue and physical activity in older women after myocardial infarction. Heart Lung. 2005;34:30-38.

Mosca L, Appel SJ, Benjamin EJ, et al. Evidenced-based guidelines for cardiovascular disease prevention in women. Circulation. 2004;109:672-693.