Leisure Time Physical Activity in Relation to Depressive Symptoms in the Black Women’s Health Study

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ABSTRACT

Background: A growing body of evidence suggests that physical activity might reduce the risk of depressive symptoms, but there are limited data on Black women. Purpose: The objective was to evaluate the association between leisure time physical activity and depressive symptoms in U.S. Black women. Methods: Participants included 35,224 women ages 21 to 69 from the Black Women’s Health Study, a follow-up study of African American women in which data are collected biennially by mail questionnaire. Women answered questions on past and current exercise levels at baseline (1995) and follow-up (1997). The Center for Epidemiologic Studies Depression Scale (CES-D) was used to measure depressive symptoms in 1999. Women who reported a diagnosis of depression before 1999 were excluded. We used multivariate logistic regression models to compute odds ratios (ORs) and 95% confidence intervals (CIs) for physical activity in relation to depressive symptoms (CES-D score ≥ 16) with control for potential confounders. Results: Adult vigorous physical activity was inversely associated with depressive symptoms. Women who reported vigorous exercise both in high school (≥ 5 hr per week) and adulthood (≥ 2 hr per week) had the lowest odds of depressive symptoms (OR = 0.76, 95% CI = 0.71–0.82) relative to never active women; the OR was 0.90 for women who were active in high school but not adulthood (95% CI = 0.85–0.96) and 0.83 for women who were inactive in high school but became active in adulthood (95% CI = 0.77–0.91). Although walking for exercise was not associated with risk of depressive symptoms overall, there was evidence of a weak inverse relation among obese women (Body Mass Index ≥ 30). Conclusions: Leisure time vigorous physical activity was associated with a reduced odds of depressive symptoms in U.S. Black women.

INTRODUCTION

Major depression is one of the most common illnesses in industrialized countries and is projected to become the world’s second leading cause of disability and mortality by 2020 (1). The prevalence of depression is greater in women than in men (2), and has been shown to be greater in African Americans than in other ethnic groups in some (2–4), but not all (5–7), studies. Established risk factors for depression include low income, low educational attainment, young age, and never having been married (8).

A growing body of evidence from largely White populations suggests that physical activity might reduce the risk of depressive symptoms. Of the 15 prospective observational studies that have examined physical activity and risk of subsequent depression, 11 found an inverse association (9–20) and 5 were null (21–25). In the only two prospective observational studies that included Black women (9,17), results were either not stratified by race (17) or were limited due to small sample size (9). Thus, there are virtually no published data on the relation of physical activity to depression in Black women.

Levels of physical activity are lower among Black women compared with other populations in the United States (26,27). If low levels of physical activity increase the risk of depressive symptoms, this may contribute to the excess burden of depression among U.S. Black women. This observational study investigates the relation of leisure time physical activity to depressive symptoms in a large cohort of U.S. Black women. We hypothesized that regular physical activity would be inversely associated with depressive symptoms. Plausible biological mechanisms to support a protective effect of physical activity on depression are increased cortical blood flow, the release of endorphins, and increased epinephrine and norepinephrine synthesis (28). Physical activity may also serve as a buffer against stressful events, enhance self-efficacy and self-esteem, and decrease social isolation.

METHODS

Study Population

The Black Women’s Health Study (BWHS) is an ongoing prospective cohort study designed to examine risk factors for

major illnesses in African American women. In 1995, approximately 59,000 Black women ages 21 to 69 years were enrolled through questionnaires mailed to subscribers of Essence magazine, members of Black professional organizations, and friends and relatives of respondents (29). The 1995 (baseline) questionnaire elicited information on demographic and behavioral characteristics, anthropometric factors, health care utilization, and medical conditions. BWHS participants represent various geographic regions of the United States, with the majority residing in California, New York, Illinois, Michigan, Georgia, and New Jersey. The cohort is followed every 2 years by postal questionnaire; the 1997 and 1999 follow-up questionnaires were completed by 90% and 87% of the original cohort, respectively.

Assessment of Depressive Symptoms

The 1999 follow-up questionnaire included the 20-item Center for Epidemiologic Studies Depression Scale (CES-D), an instrument used to assess depressive symptoms in community samples and population-based studies (30). Respondents were asked to rate each item, indicating the frequency of various feelings experienced during the previous week on a 4-point scale ranging from “rarely or none of the time” to “most or all of the time.” The measure included items such as “I felt sad,” “I felt lonely,” “I felt depressed,” and “I enjoyed life.” Total scores ranged from 0 to 60. The validity and reliability of the CES-D has been repeatedly documented (2,30–34), including among African American women (31,34).

Assessment of Physical Activity and Covariates

On the 1995 and 1997 questionnaires, women reported the average number of hours (none, < 1, 1, 2, 3–4, 5–6, 7–9, and ≥ 10) they spent each week during the past year engaged in “walking for exercise” and “vigorous exercise (such as basketball, swimming, running, aerobics).” A separate variable was included on the 1995 questionnaire to assess “vigorous exercise during high school,” using the same frequency categories as noted earlier.

The test–retest reliability of physical activity reported on the 1997 questionnaire was assessed among a subset of 1,123 BWHS participants who inadvertently completed the 1997 questionnaire twice. The weighted kappas were 0.57 for walking for exercise (hours per week) and 0.69 for vigorous physical activity (hours per week). These kappas were similar to those reported in the Women’s Health Initiative observational study of recreational physical activity in relation to breast cancer (35).

Data on height, weight, cigarette smoking, alcohol consumption, preexisting health conditions, energy intake, education, occupation, marital status, child care responsibilities, and geographic region were ascertained on the baseline survey and were considered as potential confounders or effect modifiers. Body mass index (BMI) was calculated as kilograms divided by meters squared.

Exclusion Criteria

Among the 51,170 women who completed the 1999 questionnaire (87% of original cohort), 40,795 women provided complete information on the CES-D items (80%) and were eligible for inclusion. We excluded 2,860 women who reported physician-diagnosed depression on the baseline or 1997 questionnaires, because their physical activity levels may have been influenced by depression, and 2,711 women with missing data on physical activity or covariates. The 35,224 women included in the analytic sample were similar to those not included with respect to physical activity levels (vigorous exercise: 2.0 vs. 1.9 hr per week; walking for exercise: 2.1 vs. 2.2 hr per week), age (mean years: 38.2 vs. 40.6), geographic region (% living in Northeast: 26.7 vs. 28.4; % living in South: 31.1 vs. 29.7; % living in Midwest: 23.6 vs. 22.9; and % living in West: 18.6 vs. 18.7), education (mean years: 14.9 vs. 14.5), BMI (mean kg/m²: 27.9 vs. 28.2), energy intake (mean kilocalories per day: 1,507 vs. 1,475), alcohol consumption (mean number of drinks per week: 1.4 vs. 1.5), cigarette smoking (% current: 15.2 vs. 18.2; % former: 18.9 vs. 20.1), child care responsibilities (44.5% vs. 48.5%), marital status (% married: 40.0 vs. 39.5), and occupation (% professional: 45.5 vs. 41.3).

Data Analysis

Women were divided into subgroups based on their self-reported frequency of walking for exercise or vigorous physical activity (none, <1, 1, 2, 3–4, 5–6, ≥7 hr per week). To represent physical activity in adulthood as accurately as possible, we created an average measure of physical activity from the 1995 and 1997 questionnaires (36). The self-reported physical activity variables were positively and significantly correlated across the 1995 and 1997 questionnaires: Spearman correlation coefficients were 0.51 for vigorous physical activity (p < .001) and 0.43 for walking for exercise (p < .001). We also examined changes in vigorous activity from past (high school) to present (adulthood), using a four-level variable: active in high school (≥5 hr per week) and adulthood (≥2 hr per week), active in high school but not adulthood, inactive in high school but active in adulthood, and inactive both in high school and adulthood.

We computed percentages for various characteristics associated with physical activity levels standardized to the age distribution of the cohort at baseline. Logistic regression was used to compute odds ratios (ORs) and 95% confidence intervals (95% CI) for the association of physical activity with depressive symptoms as measured by a CES-D score of 16 or higher, a standard cutoff used to identify clinical depression in community samples (30,37–40). In addition to the unadjusted models, we constructed two multivariate models. The first model controlled for known or suspected confounders of the physical activity and depression association, selected from a set of variables associated with vigorous physical activity in our cohort (Table 1). Based on these criteria, we adjusted for age (5-year intervals), geographic region (West vs. non-West), and measures of socioeconomic status, including education (≤12, 13–15, 16, 17+ years), occupation (professional or managerial, sales or clerical, service, crafts, operative, farmer, other), and marital status (single, divorced, separated, or widowed, married or partnered). The second model further controlled for factors that may be intermediates of the association between physical activity and depres-