



Arthritis as a Potential Barrier to Physical Activity Among Adults With Heart Disease --- United States, 2005 and 2007

Being physically active is an important component of heart disease (HD) management (1); however patients with HD are less likely to comply with physical activity recommendations than those without HD (2). Arthritis is a common comorbidity among persons with HD, and arthritis-associated joint pain and fear of further joint damage can be an unrecognized barrier to physical activity among persons with HD (CDC, unpublished data, 2008). To provide estimates of the magnitude of this problem at the state level, CDC combined 2005 and 2007 Behavioral Risk Factor Surveillance System (BRFSS) data to estimate overall and age- and sex-specific prevalence of self-reported doctor-diagnosed arthritis among adults aged ≥ 18 years with self-reported HD, and the prevalence of physical inactivity among adults with HD by arthritis status. The results indicated that, for these 2 years combined, arthritis affected 57.4% of adults with HD, compared with 27.4% of adults in the general population. Among adults with HD, the likelihood of physical inactivity was 30% greater compared with that of persons with HD but without arthritis, when adjusted for age, sex, race/ethnicity, education level, and body mass index (BMI) (odds ratio [OR] = 1.3). These results suggest that arthritis might be an additional barrier to increased physical activity among persons with HD. Health-care providers and public health agencies should consider addressing this barrier with arthritis-specific or general evidence-based self-management education and exercise programs for their patients with arthritis and HD.

BRFSS is a state-based, random-digit--dialed telephone survey of the noninstitutionalized U.S. civilian population aged ≥ 18 years. Data were collected from the 50 states, District of Columbia (DC), Puerto Rico, and U.S. Virgin Islands. Response rates were calculated using Council of American Survey and Research Organizations (CASRO) guidelines; for 2005 and 2007,* respectively, median response rates were 51.1% and 50.6% and cooperation rates were 75.1% and 72.1%.[†] A total of 15,725 respondents with missing arthritis or HD data were excluded, resulting in a final sample of 757,959.

HD was defined as a "yes" response to at least one of two questions: "Has a doctor, nurse, or other health professional ever told you that you had... a heart attack, also called a myocardial infarction?" or "...angina or coronary heart disease?" Doctor-diagnosed arthritis was defined as a "yes" response to the question, "Have you ever been told by a doctor or other health professional that you have some form of arthritis, rheuma-toid arthritis, gout, lupus, or fibromyalgia?" Physical activity level of respondents was determined from six questions[§] that asked about frequency and duration of participation in nonoccupational activities (i.e., lifestyle activities) of moderate and vigorous intensity; persons reporting no participation in such activities were classified as inactive. Physical activity guidelines in effect during 2005 and 2007 were used for classifying physical inactivity.[¶] Body mass index (BMI) was calculated from self-reported height and weight.

To generate nationwide estimates and 95% confidence intervals (CIs), data from 2005 and 2007 for the 50 states and DC were combined, and an annual average weighting was applied to account for multistage probability sampling. Data for arthritis and heart disease were not collected in all states in 2006, and so, were not included. To assess factors potentially confounding an association between doctor-diagnosed arthritis and physical inactivity among those

with heart disease, data were combined across states, in unadjusted and adjusted (by age, sex, race/ethnicity, education level, and BMI) logistic regression models. All other estimates in this report are unadjusted. Estimates were calculated for the 50 states, DC, and territories. Because states are most interested in the number of affected persons and unadjusted prevalence for use in planning and resource allocations, unadjusted state-specific estimates are provided in this report. Statistical significance was determined by the chi-square test ($p < 0.05$).

Average annual adult prevalence was 6.5% for HD and 26.9% for arthritis. Among all respondents, 3.7% reported HD and arthritis, 2.8% reported HD only, 23.2% reported arthritis only, and 70.4% reported neither condition ([Table 1](#)). By sex, males had a higher prevalence of HD only and a slightly higher prevalence of both conditions ($p < 0.01$); females had a higher prevalence of arthritis only ($p < 0.01$). The likelihood of having one or both conditions increased with increasing age. Whites were more likely than blacks to have one or both conditions ($p < 0.01$). Prevalence of physical inactivity was lowest among adults without arthritis or HD (11.0%; CI = 10.8%--11.2%), higher among adults with arthritis alone (17.6%; CI = 17.3%--18.0%) and HD alone (21.0%; CI = 20.0%--22.2%), and highest among adults with both conditions (29.3%; CI = 28.5%--30.2%) ($p < 0.01$) ([Figure](#)).

In logistic regression analyses of adults with HD, those with doctor-diagnosed arthritis were 60% more likely to be physically inactive (OR = 1.6; CI = 1.4--1.7; $p < 0.01$); when adjusted for age, sex, race/ethnicity, education level, and BMI, they were 30% more likely to be inactive (OR = 1.3; CI = 1.2--1.4; $p < 0.01$). The state median prevalence estimate for arthritis among adults with HD was 57.4% (range: 46.9% in Hawaii to 68.6% in Mississippi) ([Table 2](#)). The state median prevalence of physical inactivity among adults with HD and arthritis was 27.2% (range: 20.5% in Colorado to 50.3% in Kentucky); among adults who had HD only, the state median was 19.5% (range: 13.5% in Utah to 38.0% in Kentucky).

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Editorial Note:

HD and arthritis are common chronic diseases among adults in the United States, affecting 14.1 million and 46.5 million adults in 2006, respectively (3). Each condition is responsible for substantial activity limitation among adults aged ≥ 45 years, and persons with both conditions are significantly more limited than those with just one condition (4). The results of this analysis indicate that, during 2005 and 2007, doctor-diagnosed arthritis affected more than half of persons with HD. In this group, the adjusted likelihood of physical inactivity was 30% higher compared with that of persons with HD but without arthritis. State-specific estimates were generally consistent with the overall findings, with differences among states likely attributable to varying distributions of potential confounders (e.g., age, race, and education level). The analyses suggest that arthritis might be an additional barrier to being physically active among persons with HD.

The findings in this study are consistent with other research indicating that persons with both arthritis and HD might face additional barriers to increased physical activity (4). This study is the first to quantify the relationship using a population-based sample that provides both national and state-specific estimates of the prevalence and compares physical inactivity for persons with both conditions to those with HD alone.

Both HD and arthritis can interfere with physical functioning, ability to work, and ability to perform household tasks (4). These conditions also might interfere with efforts to become more physically active. Persons with arthritis face the same barriers to being more active as most adults, including lack of motivation and time, competing responsibilities, and difficulty finding an enjoyable activity (5). They also face additional barriers, such as concerns about aggravating arthritis pain and causing further joint damage, and they might be unsure about which types and amounts of activity are safe. Qualitative research suggests that persons with arthritis might experience short-term increases in pain when they initiate an exercise program, but that continued participation results in a long-term reduction in symptoms (5).

The findings in this report are subject to at least four limitations. First, arthritis, HD, and physical activity are self-reported and unconfirmed by a health-care provider or objective monitoring; however, such self-reports are

considered valid for surveillance purposes (6). Second, BRFSS excludes persons without landline telephones, persons in the military, and those residing in institutions. Estimates are weighted to the population, thus partially correcting for this, but effects might be unpredictable. Third, state prevalence estimates were not adjusted for population characteristics (e.g., age); therefore, comparisons between states should be made with caution. Finally, BRFSS response rates were low; BRFSS weighting procedures partially correct for nonresponse, but the effect of low response rates is uncertain.

Specially tailored self-management education interventions, such as the Chronic Disease Self Management Program and the arthritis-specific Arthritis Foundation (AF) Self-Help Program, help adults learn to manage arthritis pain and discuss how to safely increase physical activity (7). Several exercise programs, including EnhanceFitness, the AF Exercise Program, and the AF Aquatics Program, are available in many communities and are appropriate for adults with HD and arthritis. Self-directed physical activities, including low-impact activities such as walking, swimming, and biking, also are appropriate for adults with both conditions.**

Greater integration of heart disease and arthritis intervention efforts by health-care providers, payers, and health departments might better address the effects of these co-occurring conditions. Increasing physical activity (e.g., through aerobic exercise and strength training) can benefit persons with arthritis, HD, or both conditions (8,9) by improving physical function and lowering blood pressure and low-density lipoprotein cholesterol levels. Health-care providers should consider whether arthritis-related barriers contribute to physical inactivity in their HD patients and should help those patients learn how to overcome arthritis-specific barriers by providing appropriate advice and referrals. HD patients with arthritis should be encouraged to reduce sedentary behavior; appropriate physical activity might include moderate-intensity aerobics and muscle-strengthening exercises (10).

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* BRFSS survey data are available at http://www.cdc.gov/brfss/technical_infodata/surveydata.htm.

† The response rate is the percentage of persons who completed interviews among all eligible persons, including those who were not successfully contacted. The cooperation rate is the percentage of persons who completed interviews among all eligible persons who were contacted.

§ Available at <http://www.cdc.gov/brfss/questionnaires/pdf-ques/2005brfss.pdf> and <http://www.cdc.gov/brfss/questionnaires/pdf-ques/2007brfss.pdf>.

¶ U.S. Department of Health and Human Services. 1999 Physical activity and health: a report of the surgeon general. Atlanta, GA: US Department

of Health and Human Services, CDC; 1996. Available at <http://www.cdc.gov/nccdphp/sgr/sgr.htm>. New guidelines were released in October of 2008 (2008 Physical Activity Guideline for Americans, available at <http://www.health.gov/paguidelines>).

** Additional information available at http://www.cdc.gov/arthritis/campaigns/physical_activity/index.htm.

Table 1

TABLE 1. Percentage of respondents aged ≥ 18 years who reported heart disease and arthritis, heart disease only, arthritis only, or neither condition, by selected characteristics — Behavioral Risk Factor Surveillance System, United States, 2005 and 2007

Characteristic	Unweighted No.	Heart disease and arthritis		Heart disease only		Arthritis only		Neither condition	
		%	(95% CI)*	%	(95% CI)	%	(95% CI)	%	(95% CI)
Sex									
Male	286,066	3.9	(3.8–4.0)	3.8	(3.7–3.9)	18.7	(18.4–19.0)	73.6	(73.3–73.9)
Female	471,893	3.5	(3.4–3.6)	1.8	(1.7–1.9)	27.4	(27.2–27.6)	67.3	(67.0–67.6)
Age group (yrs)									
18–44	246,910	0.4	(0.4–0.5)	1.1	(1.0–1.2)	10.6	(10.4–10.8)	87.9	(87.7–88.1)
45–64	303,213	4.2	(4.1–4.3)	3.2	(3.0–3.3)	32.2	(31.9–32.5)	60.4	(60.1–60.8)
≥ 65	202,201	12.5	(12.2–12.8)	7.1	(6.9–7.3)	43.7	(43.2–44.1)	36.7	(36.3–37.1)
Race/Ethnicity									
White, non-Hispanic	605,447	4.1	(4.0–4.2)	2.8	(2.7–2.9)	25.6	(25.4–25.8)	67.5	(67.3–67.7)
Black, non-Hispanic	56,139	3.4	(3.2–3.6)	2.3	(2.1–2.6)	23.1	(22.4–23.7)	71.3	(70.6–71.9)
Hispanic	47,050	1.8	(1.6–2.1)	3.0	(2.6–3.3)	13.0	(12.4–13.6)	82.2	(81.5–82.9)
Other, non-Hispanic	42,325	3.3	(3.0–3.6)	2.6	(2.2–2.9)	18.0	(17.3–18.9)	76.1	(75.2–77.0)
Education level (yrs)									
≤ 11	77,412	6.3	(6.0–6.6)	4.2	(3.9–4.5)	23.6	(22.9–24.2)	66.0	(65.3–66.7)
12	232,247	4.4	(4.2–4.5)	3.0	(2.9–3.2)	25.3	(25.0–25.7)	67.3	(66.9–67.7)
≥ 13	446,791	2.8	(2.8–2.9)	2.4	(2.3–2.5)	22.0	(21.8–22.3)	72.8	(72.5–73.0)
BMI†									
Underweight/Normal	273,708	2.5	(2.4–2.6)	2.3	(2.2–2.4)	18.1	(17.9–18.4)	77.1	(76.8–77.4)
Overweight	263,204	3.7	(3.6–3.8)	3.1	(3.0–3.3)	23.6	(23.3–23.9)	69.5	(69.2–69.9)
Obese	187,106	5.7	(5.6–5.9)	3	(2.8–3.1)	30.7	(30.3–31.1)	60.6	(60.1–61.0)
Total‡	757,959	3.7	(3.6–3.8)	2.8	(2.7–2.9)	23.2	(23.0–23.4)	70.4	(70.2–70.6)

* Confidence interval.

† Body mass index, calculated as weight (kg) / height (m)²; normal = 18.5–24.9, overweight = 25.0–29.9, and obese = ≥ 30.0 .

‡ Number of persons who provided a response for heart disease and for arthritis. Some categories might not add to total because of missing demographic data.

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Table 2

TABLE 2. Prevalence of arthritis among adults aged ≥ 18 years with heart disease, and prevalence of physical inactivity* among adults with heart disease, with and without arthritis, by state/area — Behavioral Risk Factor Surveillance System, United States,† 2005 and 2007

State/Area	No. of respondents	Arthritis among adults with heart disease				Physical inactivity among adults with heart disease			
		Weighted no. (In 1,000s)‡	%	(95% CI)†	Without arthritis		With arthritis		
					%	(95% CI)	%	(95% CI)	
Alabama	10,447	171	63.9	(50.7–67.8)	18.7	(13.8–24.8)	36.3	(31.6–41.2)	
Alaska	5,365	12	63.0	(54.5–70.8)	20.2	(11.8–32.3)	23.4	(13.9–36.7)	
Arizona	9,443	157	51.0	(44.4–57.5)	14.7	(8.6–24.0)	29.1	(22.6–36.5)	
Arkansas	11,013	96	61.1	(57.7–64.4)	23.9	(19.1–29.5)	26.5	(22.9–30.5)	
California	11,825	645	48.5	(43.8–53.3)	17.9	(12.9–24.3)	22.2	(16.8–28.8)	
Colorado	17,887	79	54.6	(50.8–58.3)	17.7	(13.6–22.7)	20.5	(16.9–24.6)	
Connecticut	12,777	79	53.9	(49.8–58.0)	17.5	(13.4–22.7)	22.9	(18.9–27.4)	
Delaware	8,193	29	60.8	(56.1–65.3)	19.5	(14.2–26.3)	29.6	(24.4–35.4)	
District of Columbia	7,700	12	61.5	(55.5–67.2)	16.3	(10.9–23.5)	31.2	(23.5–40.1)	
Florida	47,739	591	55.5	(52.4–58.5)	24.7	(20.8–29.1)	29.1	(25.8–32.6)	
Georgia	13,767	221	55.8	(51.7–59.8)	24.2	(18.9–30.4)	33.6	(29.3–38.2)	
Hawaii	13,019	23	46.9	(42.1–51.7)	15.1	(11.1–20.1)	21.3	(16.3–27.3)	
Idaho	11,049	38	55.7	(50.5–60.8)	16.6	(12.0–22.6)	24.8	(20.7–29.5)	
Illinois	10,313	320	57.5	(52.9–61.9)	28.3	(21.9–35.6)	31.2	(26.6–36.2)	
Indiana	11,626	211	61.9	(57.4–66.2)	17.3	(12.8–22.8)	25.6	(21.8–29.9)	
Iowa	10,479	83	58.5	(54.5–62.4)	20.1	(15.6–25.4)	27.1	(22.8–31.8)	
Kansas	17,121	75	56.6	(53.5–59.7)	18.0	(14.9–21.5)	34.6	(31.2–38.2)	
Kentucky	13,536	151	56.1	(52.6–59.5)	38.0	(32.7–43.7)	50.3	(45.9–54.6)	
Louisiana	9,620	126	55.4	(50.8–60.0)	36.4	(29.5–43.9)	40.8	(35.3–46.6)	
Maine	10,790	44	61.4	(57.4–65.3)	20.0	(15.2–25.9)	27.2	(22.8–32.2)	
Maryland	17,461	138	59.4	(55.4–63.3)	17.6	(13.5–22.7)	26.2	(22.3–30.5)	
Massachusetts	30,413	164	56.8	(53.6–59.8)	26.1	(21.6–31.1)	29.3	(25.8–33.0)	
Michigan	19,641	359	65.9	(63.2–68.5)	19.1	(15.5–23.2)	28.3	(25.3–31.6)	
Minnesota	7,603	105	52.3	(47.5–57.1)	20.5	(15.5–26.6)	20.8	(16.3–26.3)	
Mississippi	12,257	109	68.6	(65.2–71.9)	31.0	(25.2–37.4)	35.2	(31.2–39.4)	
Missouri	10,427	201	62.8	(58.6–66.8)	17.2	(12.5–23.1)	24.3	(20.3–28.8)	
Montana	10,978	23	57.2	(52.9–61.4)	21.6	(15.9–28.6)	22.8	(18.4–27.8)	
Nebraska	19,276	45	61.2	(57.3–64.9)	24.3	(18.9–30.6)	27.1	(23.1–31.6)	
Nevada	7,286	60	53.0	(46.7–59.2)	20.0	(12.8–29.8)	23.4	(17.0–31.2)	
New Hampshire	12,028	37	58.8	(54.8–62.6)	17.1	(13.0–22.1)	24.1	(20.2–28.6)	
New Jersey	20,899	225	53.5	(49.2–57.7)	22.0	(17.3–27.5)	32.4	(28.3–36.7)	
New Mexico	12,191	40	52.1	(48.0–56.2)	19.2	(15.0–24.3)	24.5	(20.3–29.3)	
New York	14,321	477	55.5	(51.4–59.4)	21.2	(16.6–26.7)	26.4	(22.5–30.8)	
North Carolina	32,038	264	58.9	(56.4–61.3)	22.4	(19.1–26.1)	30.7	(28.1–33.4)	
North Dakota	8,761	17	56.2	(51.8–60.4)	21.3	(16.1–27.7)	23.6	(18.9–29.0)	
Ohio	18,727	377	62.2	(58.8–65.5)	17.1	(13.3–21.7)	28.6	(24.7–32.9)	
Oklahoma	21,170	136	62.6	(59.5–65.5)	21.8	(18.0–26.2)	35.4	(31.8–39.1)	
Oregon	16,966	84	56.6	(53.0–60.2)	14.8	(11.4–18.9)	22.9	(19.5–26.8)	
Pennsylvania	26,609	422	63.0	(59.7–66.2)	19.6	(15.4–24.6)	27.5	(24.0–31.3)	
Rhode Island	8,475	30	60.5	(55.9–64.8)	19.5	(14.2–26.1)	32.6	(27.2–38.4)	
South Carolina	18,835	131	62.9	(59.0–66.9)	18.4	(14.6–22.9)	28.2	(24.8–31.8)	
South Dakota	13,786	23	60.3	(56.9–63.5)	20.4	(16.6–25.0)	31.5	(27.9–35.5)	
Tennessee	9,781	217	61.1	(55.7–66.2)	28.1	(20.9–36.7)	46.7	(41.5–52.0)	
Texas	23,760	555	51.7	(48.2–55.1)	20.2	(16.1–25.0)	32.2	(28.3–36.3)	
Utah	10,216	38	54.6	(49.4–59.7)	13.5	(8.2–21.5)	24.8	(19.3–31.3)	
Vermont	13,699	18	60.3	(56.4–64.0)	15.3	(11.8–19.7)	26.0	(22.1–30.4)	
Virginia	11,696	198	55.6	(50.7–60.4)	15.5	(11.0–21.3)	27.4	(22.9–32.4)	
Washington	49,183	144	57.4	(55.2–59.6)	14.9	(12.6–17.6)	21.8	(19.7–24.2)	
West Virginia	7,998	98	62.0	(58.6–65.3)	30.0	(24.8–35.8)	42.9	(38.7–47.2)	
Wisconsin	12,335	140	61.0	(56.3–65.6)	16.1	(10.9–23.2)	24.3	(19.9–29.3)	
Wyoming	11,169	12	57.1	(53.0–61.2)	22.7	(16.8–29.9)	23.7	(19.5–28.5)	
Median**			57.4		19.5		27.2		
Puerto Rico	7,723	131	48.6	(44.6–52.6)	46.9	(40.8–53.0)	56.3	(51.1–61.4)	
U.S. Virgin Islands	4,960	1	35.3	(27.4–44.1)	15.6	(8.4–27.2)	33.7	(20.9–49.3)	

* Physical activity level of respondents was determined from six questions that asked about frequency and duration of participation in nonoccupational activities of moderate and vigorous intensity; those reporting no participation in such activities were classified as inactive (engaged in no nonoccupational physical activity); all others were classified as active.

† Includes all 50 states, the District of Columbia, Puerto Rico, and the U.S. Virgin Islands.

‡ Weighted annual average number of adults with heart disease who also have arthritis.

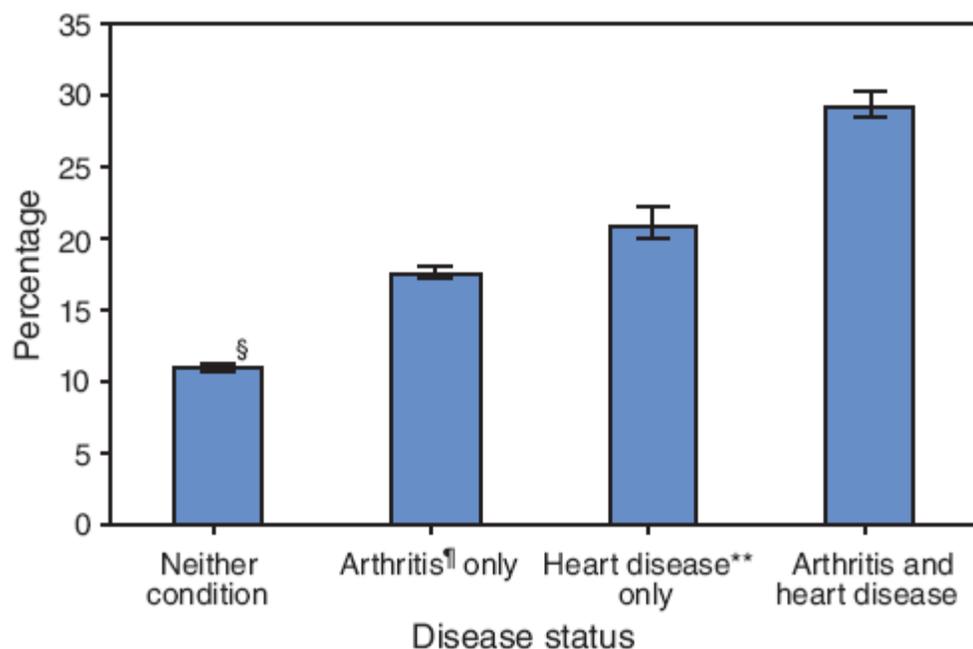
† Confidence interval.

** Does not include Puerto Rico or the U.S. Virgin Islands.

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Figure

FIGURE. Physical inactivity among adults aged ≥ 18 years,* by disease status — Behavioral Risk Factor Surveillance System, United States,† 2005 and 2007



* Includes all respondents reporting no activity when asked six questions about frequency and duration of participation in nonoccupational activities of moderate and vigorous intensity (i.e., lifestyle activities). All other respondents were classified as active. Questions available at <http://www.cdc.gov/brfss/questionnaires/pdf-ques/2005brfss.pdf> and <http://www.cdc.gov/brfss/questionnaires/pdf-ques/2007brfss.pdf>.

† Includes all 50 states and the District of Columbia.

§ 95% confidence interval.

¶ Doctor-diagnosed arthritis was defined as a “yes” response to the question, “Have you ever been told by a doctor or other health professional that you have some form of arthritis, rheumatoid arthritis, gout, lupus, or fibromyalgia?”

** Heart disease was defined as a “yes” response to at least one of two questions: “Has a doctor, nurse, or other health professional ever told you that you had... a heart attack, also called a myocardial infarction?” or “...angina or coronary heart disease?”

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