



Arthritis as a Potential Barrier to Physical Activity Among Adults with Diabetes --- United States, 2005 and 2007

The American Diabetes Association and the American College of Sports Medicine agree that increasing physical activity among persons with diabetes is an important public health goal to 1) reduce blood glucose and risk factors for complications (e.g., obesity and hypertension) in persons with diabetes and 2) improve cardiovascular disease outcomes (1,2). Among adults with diabetes, co-occurring arthritis might present an underrecognized barrier to increasing physical activity, but to date this has not been directly studied. To estimate the prevalence of 1) diagnosed arthritis among adults with diabetes and 2) physical inactivity among adults with diabetes by arthritis status, CDC analyzed combined 2005 and 2007 data from the Behavioral Risk Factor Surveillance System (BRFSS). This report describes the results of that analysis, which indicated that 1) arthritis prevalence was 52.0% among adults with diagnosed diabetes and 2) the prevalence of physical inactivity was higher among adults with diabetes and arthritis (29.8%) compared with adults with diabetes alone (21.0%), an association that was independent of age, sex, or body mass index (BMI). The higher prevalence of physical inactivity among adults who have both diabetes and arthritis suggests that arthritis might be an additional barrier to increasing physical activity. Health-care providers and public health agencies should consider addressing this barrier with arthritis-specific or general evidence-based self-management and exercise programs.

The BRFSS survey is a state-based, random-digit--dialed telephone survey of the civilian, noninstitutionalized U.S. adult population aged ≥ 18 years and is conducted in all 50 states, the District of Columbia (DC), Guam, Puerto Rico, and the U.S. Virgin Islands. Diabetes was defined as a "yes" response to the question, "Have you ever been told by a doctor that you have diabetes?" 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?" This question is included in the BRFSS core questionnaire in odd-numbered years only. 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; those reporting no participation in such activities were classified as inactive (i.e., engaged in no nonoccupational physical activity), and all others as active. BMI was calculated from self-reported height and weight.

To obtain adequate sample sizes for greater statistical power, CDC combined data for the 50 states and DC from 2005 and 2007, calculated estimates, and applied an annual average weighting; 95% confidence intervals (CIs) were calculated using sample design factors to account for the multistage probability sample. To assess factors potentially confounding an association between doctor-diagnosed arthritis and physical inactivity among those with diabetes, data were combined across states/areas in unadjusted and adjusted (by age, sex, and BMI) logistic regression models. Age groups were 18--44 years, 45--64 years, and ≥ 65 years. BMI groups were underweight/normal weight (BMI < 25.0), overweight (BMI 25.0 to < 30.0), and obese (BMI ≥ 30). Statistical significance was determined by nonoverlapping CIs. State-level estimates then were calculated for the 50 states and DC (reported medians were based on these areas) and for Guam, Puerto Rico, and the U.S. Virgin Islands. Council of American Survey Organizations (CASRO) response rates among the 50 states, DC, and the three territories for 2005 ranged from 34.6% (New Jersey) to 67.4% (Alaska) (median: 51.1%), and cooperation rates ranged from 58.7% (California) to 85.3% (Minnesota) (median:

75.1%).[†] CASRO response rates for 2007 ranged from 26.9% (New Jersey) to 65.4% (Nebraska) (median: 50.6%), and cooperation rates ranged from 49.6% (New Jersey) to 84.6% (Minnesota) (median: 72.1%).[§]

During 2005 and 2007, the prevalence of arthritis among adults with diabetes was 52.0% (CI = 51.3%--52.7%), compared with 26.9% (CI = 26.7%--27.1%) for all adults aged ≥ 18 years. The prevalence of arthritis among persons with diabetes was higher than in the general population for both sexes: males (45.9% [CI = 44.8%--47.1%] versus 22.6 [CI = 22.3%--22.9%]); females (58.0% [CI = 57.1%--59.0%] versus 30.9% [CI = 30.7%--31.2%]), respectively. In addition, arthritis prevalence among persons with diabetes was higher than in the general population for all age groups (i.e., 18--44 years, 45--64 years, and ≥ 65 years): 27.6% (CI = 25.7%--29.7%) versus 11.0% (CI = 10.8%--11.2%), 51.8% (CI = 50.8%--52.9%) versus 36.4% (CI = 36.1%--36.8%), and 62.4% (CI = 61.3%--63.5%) versus 56.2% (CI = 55.8%--56.6%), respectively. Prevalence of physical inactivity was lowest among adults without arthritis or diabetes (10.9% [CI = 10.7%--11.1%]), higher among adults with arthritis alone (17.3% [CI = 17.0%--17.6%]) and diabetes alone (21.0% [CI = 20.0%--22.1%]), and highest among adults with both conditions (29.8% [CI = 29.0%--30.7%]) (Figure). In logistic regression analyses, the unadjusted odds ratio (OR) for the association between doctor-diagnosed arthritis and physical inactivity among adults with doctor-diagnosed diabetes was 1.6 (CI = 1.3--1.7); adjusted for age and sex, the OR was 1.4 (CI = 1.3--1.5); and adjusted for age, sex, and BMI, the OR was 1.3 (CI = 1.2--1.4). In state-specific analyses, the state median prevalence estimate of physical inactivity among adults with diabetes and arthritis was 28.9% (range: 20.2% in California to 46.4% in Tennessee). The state median prevalence estimate of physical inactivity among adults who had diabetes and no arthritis was 19.5% (range: 9.0% in Alaska to 30.2% in West Virginia) (Table).

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Editorial Note:

In the United States, approximately 20.6 million adults were reported to have diabetes in 2005 (3), with nearly seven in 10 having diabetes diagnosed by a health professional. In addition, during 2003--2005, approximately 46.4 million adults had arthritis (4). Because physical activity is a recommended self-management strategy for both conditions, examining the effect of co-existing arthritis and diabetes on physical activity levels is warranted.

The results of this analysis indicated that, during 2005 and 2007, doctor-diagnosed arthritis affected approximately half of adults with doctor-diagnosed diabetes. The prevalence of self-reported physical inactivity was significantly higher among those with arthritis and diabetes than among those with diabetes alone. This association remained significant after adjustment for age, sex, and BMI, factors that might have otherwise explained the association. State-specific estimates were consistent with the overall findings, with state-to-state differences likely attributable to differences in the distribution of factors associated with both arthritis and physical inactivity in the state population. Because BRFSS data are cross-sectional, they can only demonstrate an association; the temporal sequence of condition onset is unknown.

The associations between arthritis and physical inactivity among adults with diabetes found in this analysis suggest that arthritis might be a barrier to being physically active in this population. Being more physically active (e.g., through aerobic exercise or strength training) can benefit persons with either arthritis or diabetes and those with both conditions (1). Persons with diabetes who are inactive and become more active benefit from improved physical function and glucose tolerance (5), but they face the same common barriers to being more physically active as most adults, such as lack of time, competing responsibilities, lack of motivation, and difficulty finding an enjoyable activity (6). Those who also have arthritis face additional disease-specific barriers, such as concerns about aggravating arthritis pain (6) and causing further joint damage, and they might be unsure about which types and amounts of activity are safe for their joints. Health-care providers interested in improving diabetes management might want to especially consider arthritis-related barriers among persons with diabetes who are physically inactive.

Specially tailored self-management education interventions, such as the Chronic Disease Self Management Program

(7) and the arthritis-specific Arthritis Foundation Self-Help Program, help adults learn to manage arthritis pain and discuss how to safely increase physical activity (8). In addition, several exercise programs, including EnhanceFitness (2), the Arthritis Foundation Exercise Program, and the Arthritis Foundation Aquatics Program (8), are available in many communities and are appropriate for adults with diabetes and arthritis. Self-directed physical activities, including joint-friendly activities such as walking, swimming, and biking, also are appropriate for adults with both conditions.[¶]

The findings in this report are subject to at least five limitations. First, doctor-diagnosed arthritis, doctor-diagnosed diabetes, and activity level are self-reported in BRFSS and have not been confirmed by a health-care provider or objective monitoring; however, such self-reports have been shown to be valid for surveillance purposes (9,10). Second, BRFSS is a telephone survey and does not include persons without landline telephones, persons in the military, or those residing in institutions. Third, comparisons of tabular data between states should be made with caution because the prevalence estimates are not adjusted for population characteristics (e.g., age) that might explain differences. Unadjusted data are presented in this report to provide actual estimates for state-level program planning. Fourth, BRFSS response rates were low for both survey years. BRFSS weighting procedures partially correct for nonresponse. The effect of low response rates is uncertain. Finally, the findings in this report do not account for persons with undiagnosed diabetes.

In 2007, CDC released a reference guide for planning physical activity interventions for older adults, including those with diabetes (2). This guide suggests different programs sensitive to the medical needs of persons with diabetes and those with chronic disease complications or physical limitations, and promotes active aging among persons not yet limited by complications or limitations of diabetes or arthritis. Because arthritis appears to be an additional barrier to increasing physical activity, state-level diabetes programs whose aim is to increase physical activity among adults with diabetes might meet their own goals more readily by integrating their efforts with arthritis programs.

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

† 2005 BRFSS data quality report available at http://www.cdc.gov/brfss/technical_infodata/pdf/2005summarydataqualityreport.pdf.

§ 2007 BRFSS data quality report available at http://www.cdc.gov/brfss/technical_infodata/pdf/2007summarydataqualityreport.pdf.

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

Table

TABLE. Prevalence of arthritis among adults aged ≥ 18 years with diabetes and prevalence of physical inactivity* among adults with diabetes 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 diabetes				Physical inactivity among adults with diabetes			
		Weighted no. (in 1,000s)§	%	(95% CI)¶	Without arthritis		With arthritis		
					%	(95% CI)	%	(95% CI)	
Alabama	10,447	201	58.7	(55.0–62.2)	26.0	(21.1–31.7)	35.6	(31.2–40.2)	
Alaska	5,365	13	53.8	(45.4–62.1)	9.0	(5.1–15.4)	30.1	(20.1–42.3)	
Arizona	9,443	156	45.9	(40.0–51.9)	15.4	(10.0–23.1)	28.3	(21.8–35.7)	
Arkansas	11,013	100	55.4	(51.9–58.8)	24.4	(19.4–30.3)	30.8	(26.9–35.1)	
California	11,825	810	43.6	(39.5–47.8)	22.5	(17.1–29.0)	20.2	(15.7–25.6)	
Colorado	17,887	79	46.3	(42.7–49.8)	14.9	(11.5–19.0)	24.6	(20.6–29.1)	
Connecticut	12,777	82	44.8	(41.0–48.6)	16.8	(13.1–21.2)	27.4	(23.0–32.4)	
Delaware	8,183	30	54.1	(49.5–58.6)	18.1	(13.3–24.2)	27.9	(23.0–33.3)	
District of Columbia	7,700	16	48.2	(43.5–52.9)	22.8	(17.1–29.6)	29.2	(23.6–35.4)	
Florida	47,739	580	49.2	(46.1–52.3)	24.6	(20.9–28.6)	34.0	(30.1–38.0)	
Georgia	13,757	340	55.6	(52.0–59.1)	15.8	(12.7–19.6)	29.2	(25.4–33.3)	
Hawaii	13,019	31	42.6	(38.6–46.8)	19.5	(15.3–24.5)	24.5	(19.6–30.1)	
Idaho	11,049	41	53.7	(49.9–57.4)	15.3	(11.7–19.7)	24.7	(20.5–29.5)	
Illinois	10,313	398	50.2	(46.1–54.2)	21.8	(16.8–27.9)	29.5	(24.9–34.5)	
Indiana	11,626	220	57.0	(53.5–60.4)	22.0	(17.5–27.3)	29.6	(25.4–34.1)	
Iowa	10,479	82	54.2	(50.5–58.0)	15.4	(11.8–19.9)	34.5	(29.8–39.5)	
Kansas	17,121	75	51.5	(48.6–54.5)	19.0	(16.0–22.5)	33.3	(29.9–37.0)	
Kentucky	13,536	153	53.9	(50.2–57.6)	32.8	(27.6–38.4)	44.8	(40.3–49.4)	
Louisiana	9,620	157	54.1	(50.4–57.7)	28.7	(24.1–33.9)	42.8	(37.9–47.8)	
Maine	10,790	44	56.6	(52.7–60.5)	13.0	(9.4–17.8)	27.5	(23.3–32.2)	
Maryland	17,461	177	55.1	(51.9–58.3)	18.8	(15.4–22.7)	28.9	(25.1–32.9)	
Massachusetts	30,413	161	48.5	(45.6–51.4)	21.4	(18.1–25.2)	31.0	(27.4–34.8)	
Michigan	19,641	365	57.5	(54.8–60.2)	18.3	(15.2–21.9)	29.1	(26.0–32.3)	
Minnesota	7,603	106	47.8	(42.8–52.8)	16.0	(11.4–21.9)	20.3	(15.2–26.7)	
Mississippi	12,257	130	58.4	(55.4–61.4)	24.0	(20.2–28.3)	38.7	(35.0–42.6)	
Missouri	10,427	214	62.2	(57.9–66.3)	20.8	(14.6–28.7)	30.4	(25.9–35.2)	
Montana	10,976	23	52.9	(48.7–57.1)	16.7	(12.4–22.2)	23.4	(18.7–28.9)	
Nebraska	19,276	50	54.0	(50.3–57.6)	20.0	(16.1–24.6)	27.3	(23.1–31.9)	
Nevada	7,286	70	51.8	(46.1–57.4)	23.9	(17.2–32.1)	23.3	(17.5–30.3)	
New Hampshire	12,028	36	53.0	(49.3–56.6)	17.2	(13.6–21.6)	29.9	(25.6–34.5)	
New Jersey	20,899	273	50.2	(47.1–53.4)	24.6	(20.8–28.9)	32.6	(28.5–36.9)	
New Mexico	12,191	50	47.4	(43.6–51.2)	17.4	(13.7–21.8)	27.2	(23.0–31.8)	
New York	14,321	600	51.6	(48.0–55.1)	21.7	(17.4–26.6)	26.7	(22.7–31.2)	
North Carolina	32,038	320	56.1	(53.9–58.2)	21.1	(18.5–23.8)	32.4	(29.9–35.1)	
North Dakota	8,761	16	49.8	(45.4–54.3)	18.8	(14.0–24.7)	26.6	(21.6–32.3)	
Ohio	18,727	431	58.9	(55.7–61.9)	21.9	(17.8–26.7)	28.3	(24.8–31.9)	
Oklahoma	21,170	142	55.5	(52.5–58.4)	20.9	(17.3–25.1)	34.1	(30.7–37.7)	
Oregon	16,966	95	50.4	(47.1–53.7)	14.9	(11.7–18.7)	23.9	(20.5–27.7)	
Pennsylvania	26,609	455	57.0	(53.8–60.3)	19.9	(16.5–23.8)	28.0	(24.5–31.7)	
Rhode Island	8,475	31	56.7	(52.3–61.0)	20.4	(15.4–26.5)	32.5	(27.3–38.2)	
South Carolina	18,835	176	56.0	(53.4–58.6)	20.2	(16.6–24.3)	29.0	(26.1–32.1)	
South Dakota	13,786	19	50.9	(47.4–54.5)	16.2	(12.8–20.2)	27.2	(23.4–31.3)	
Tennessee	9,781	266	57.4	(52.9–61.8)	32.9	(26.8–39.7)	46.4	(41.3–51.6)	
Texas	23,760	691	46.3	(43.7–49.0)	20.0	(17.3–23.0)	32.3	(28.8–36.0)	
Utah	10,216	47	49.8	(45.3–54.3)	14.1	(10.0–19.6)	24.5	(19.2–30.8)	
Vermont	13,699	17	53.0	(49.1–57.0)	13.9	(10.3–18.5)	25.1	(21.0–29.8)	
Virginia	11,696	234	55.5	(51.7–59.2)	14.8	(11.4–19.0)	26.3	(22.2–30.8)	
Washington	49,183	162	50.8	(48.8–52.8)	14.9	(12.9–17.1)	23.9	(21.6–26.3)	
West Virginia	7,998	90	58.8	(55.3–62.3)	30.2	(25.1–36.0)	39.0	(34.8–43.4)	
Wisconsin	12,335	153	56.9	(52.8–60.9)	11.1	(8.1–15.2)	23.5	(19.3–28.4)	
Wyoming	11,169	14	52.6	(48.8–56.3)	14.7	(11.2–18.9)	27.7	(23.3–32.7)	
Median**	—	—	53.7	(51.5–55.1)	19.5	(17.2–20.9)	28.9	(27.4–29.9)	
Guam	657	2	37.4	(25.4–51.2)	—	—	—	—	
Puerto Rico	7,723	163	46.3	(43.1–49.6)	45.7	(40.9–50.7)	55.4	(50.9–59.8)	
U.S. Virgin Islands	4,960	2	31.8	(27.1–36.9)	20.8	(15.7–27.1)	32.0	(24.1–41.1)	

* 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, the District of Columbia, Guam, Puerto Rico, and the U.S. Virgin Islands.

§ Weighted annual average number of adults with diabetes who also have arthritis.

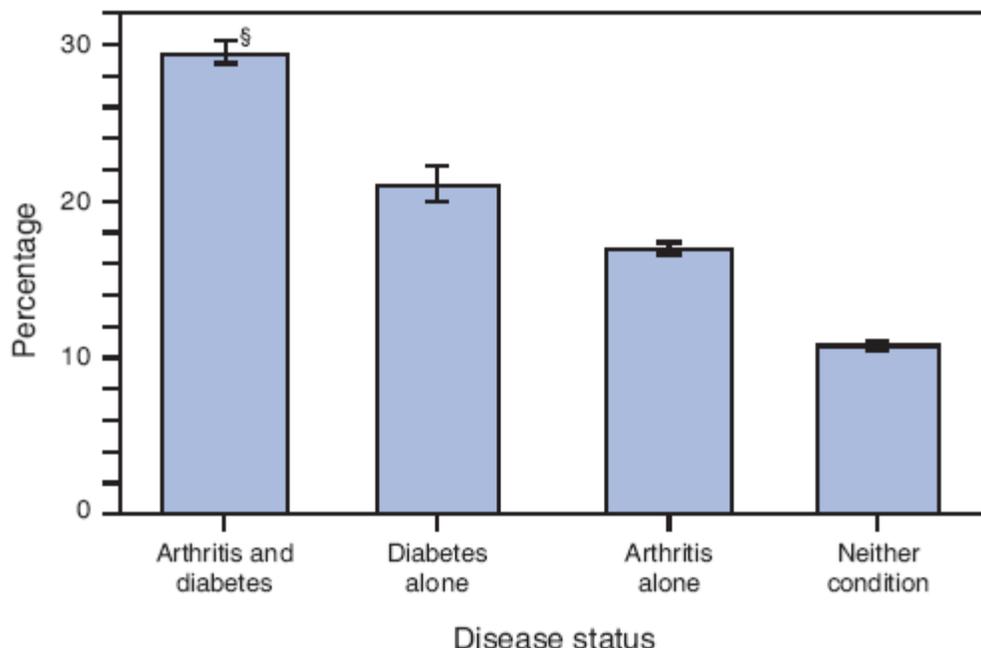
¶ Confidence interval.

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

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Figure

FIGURE. Prevalence of 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.

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