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State-Specific Prevalence of No Leisure-Time Physical Activity Among Adults With and Without Doctor-Diagnosed Arthritis — United States, 2009

The prevalence of no leisure-time physical activity (LTPA) among U.S. residents decreased from 31% in 1989 to 25% in 2002 and was still at 25% in 2008, based on Behavioral Risk Factor Surveillance System (BRFSS) data. Further reduction in the prevalence of no LTPA among all adults might be hindered by population subgroups that have exceptionally high rates of no LTPA, such as adults with arthritis. Approximately 50 million adults have arthritis, the majority of whom have arthritis-specific barriers to being physically active, such as pain and fear of making their arthritis worse (*1,2*). Despite the known benefits of physical activity for arthritis (e.g., reduced pain), persons with arthritis are more likely to report no LTPA (*3–5*). To assess state-specific prevalence of no LTPA among adults with and without doctor-diagnosed arthritis, CDC analyzed BRFSS data from 2009. This report summarizes the results of that analysis, which found that among adults with arthritis 1) prevalence of no LTPA is significantly higher compared with adults without arthritis in every state and the District of Columbia (DC), 2) the disparity in prevalence of no LTPA between adults with and without arthritis is large (median: 53% disparity gap), 3) 23 (45%) states had an age-standardized prevalence of no LTPA ≥30.0%, and 4) adults with arthritis reporting no LTPA comprised a substantial proportion (median: 35.2%) of all adults reporting no LTPA in each state. To reduce the prevalence of no LTPA among all adults, physical activity promotion initiatives should include interventions such as targeted health communication campaigns and community-based group exercise programs proven safe and effective for adults with arthritis.

BRFSS is an annual, random-digit–dialed landline telephone survey representative of the noninstitutionalized adult population aged ≥18 years that is conducted in all 50 states, DC, and the U.S. territories.* Data from 2009 (432,607 respondents) were used to assess prevalence of no LTPA (50 states and DC) by arthritis status and to produce age-standardized prevalence of no LTPA maps. For 2009, the median Council of American Survey and Research Organizations (CASRO)† response rate was 52.5% and the median CASRO cooperation rate was 75.0%. Respondents were defined as having arthritis if they reported 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?" Respondents were classified as "no LTPA" if they answered "no" to the question, "During the past month, other than your regular job, did you participate in any physical activities or exercises such as running, calisthenics, golf, gardening, or walking for exercise?"

The unstandardized prevalence of no LTPA with 95% confidence intervals (CIs) was estimated for each state, by arthritis status, using sampling weights, which take into account the complex sample design, nonresponse, and noncoverage. State-specific and median relative percent differences (percent disparity gap) in unstandardized prevalence of no LTPA were calculated using the following formula: (prevalence of no LTPA with arthritis - prevalence of no LTPA without arthritis) / prevalence of no LTPA without arthritis × 100. The contribution

*Additional information is available at http://www.cdc.gov/brfss/technical_infodata/surveydata.htm.

†CASRO response rates are defined as the percentage of completed interviews among all eligible persons. CASRO cooperation rates are defined as the percentage of completed interviews among all eligible persons who were actually contacted.

INSIDE

1646 Update: Influenza Activity — United States, October 2–November 26, 2011
1650 Recommendations for Use of an Isoniazid-Rifapentine Regimen with Direct Observation to Treat Latent *Mycobacterium tuberculosis* Infection
1654 Notes from the Field: *Campylobacter jejuni* Infections Associated with Sheep Castration — Wyoming, 2011
1655 Announcements
1656 QuickStats

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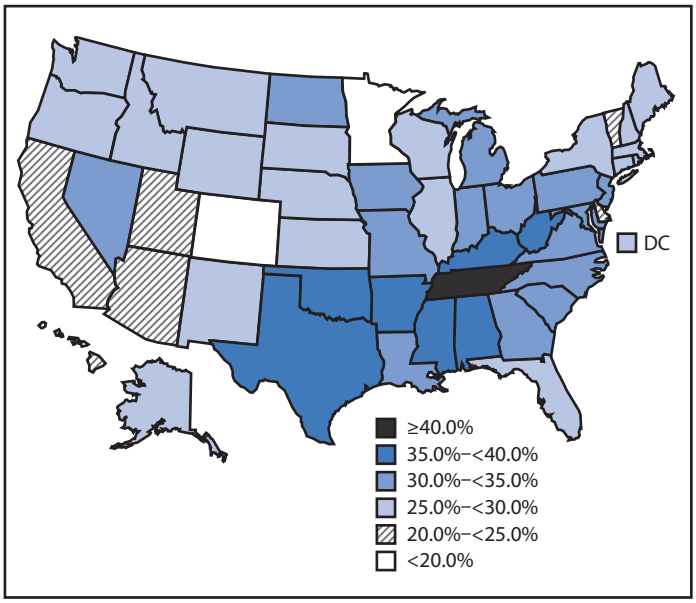
(percent arthritis impact) of adults with arthritis reporting no LTPA on the overall prevalence of no LTPA in each state was calculated using the following formula: weighted number of adults with arthritis reporting no LTPA / weighted number of all adults reporting no LTPA × 100. Statistical significance was determined using t-tests. For mapping, age-standardized (based on the 2000 U.S. standard population), state-specific prevalence of no LTPA estimates among adults with arthritis were used to allow comparison of state data (Figure).

The unstandardized prevalence of no LTPA was significantly higher among adults with arthritis (median: 31.8% [CI = 30.2%–32.9%]; range: 21.1% in Minnesota to 42.6% in Tennessee) compared with adults without arthritis (median: 20.7% [CI = 19.6%–21.8%]; range: 13.9% in Oregon to 28.8% in West Virginia) in all states and DC (Table). The age-standardized prevalence of no LTPA was similar to unstandardized estimates (age-standardized prevalence, adults with arthritis range: 16.5% to 42.0%; adults without arthritis range: 14.3% to 29.3%).

The unstandardized prevalence of no LTPA for all states was approximately 53% higher (median percent disparity gap: 52.9% [CI = 47.6%–59.6%]; range: 27.9% in New York to 83.5% in Oregon) among adults with arthritis than adults without arthritis. Adults with arthritis reporting no LTPA comprised a substantial proportion of all adults reporting no LTPA in each state (percent arthritis impact: 35.2% [CI = 34.5%–36.4%]; range: 25.4% in California to 46.8% in Kentucky).

FIGURE. Age-standardized prevalence of no leisure time physical activity among adults with arthritis — Behavioral Risk Factor Surveillance System, United States, 2009



In 2009, the age-standardized prevalence of no LTPA among adults with arthritis was ≥30% in 23 states (including ≥40% in

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TABLE. Prevalence of no leisure-time physical activity (LTPA) among adults with and without arthritis,* by state/area, — Behavioral Risk Factor Surveillance System, United States, 2009

	With arthritis				Without arthritis					
State/Area	Sample size	No.	%	(95% CI)	Sample size	No.	%	(95% CI)	% disparity gap†	% arthritis impact§
Alabama	2,842	456,247	39.3	(36.7–42.0)	3,727	604,895	26.8	(24.6–29.0)	46.6	43.0
Alaska	693	34,394	29.8	(24.9–35.2)	1,642	75,927	20.2	(17.3–23.4)	47.5	31.2
Arizona	2,060	315,038	27.5	(24.5–30.7)	3,258	568,619	15.9	(13.9–18.2)	73.0	35.7
Arkansas	1,653	254,851	39.1	(36.0–42.4)	2,202	356,468	25.0	(22.4–27.7)	56.4	41.7
California	4,834	1,342,835	26.7	(24.9–28.5)	10,774	3,945,040	20.0	(18.9–21.1)	33.5	25.4
Colorado	3,755	181,016	22.1	(20.4–23.9)	7,189	421,370	16.1	(14.8–17.4)	37.3	30.0
Connecticut	2,231	197,104	30.2	(27.5–33.0)	4,086	363,781	18.5	(16.9–20.2)	63.2	35.1
Delaware	1,515	45,471	26.9	(24.0–30.0)	2,452	87,465	19.6	(17.5–21.9)	37.2	34.2
District of Columbia	1,173	27,334	28.6	(25.5–31.9)	2,569	60,450	16.7	(14.9–18.7)	71.3	31.1
Florida	4,521	1,146,166	30.5	(28.3–32.8)	6,987	2,150,104	21.2	(19.5–23.0)	43.9	34.8
Georgia	2,039	571,040	34.8	(31.6–38.2)	3,606	1,090,605	20.6	(18.7–22.7)	68.9	34.4
Hawaii	1,861	54,199	26.3	(23.7–29.2)	4,622	137,927	18.0	(16.5–19.7)	46.1	28.2
Idaho	1,821	78,822	30.4	(27.6–33.2)	3,381	146,432	17.5	(15.9–19.3)	73.7	35.0
Illinois	2,091	779,109	31.0	(28.5–33.7)	3,617	1,442,024	20.8	(19.0–22.6)	49.0	35.1
Indiana	3,567	497,300	36.7	(34.6–38.9)	5,325	751,745	23.0	(21.4–24.7)	59.6	39.8
Iowa	2,045	190,134	33.7	(31.3–36.2)	3,814	345,129	20.7	(19.0–22.5)	62.8	35.5
Kansas	6,308	159,607	32.2	(30.8–33.6)	12,319	315,134	20.2	(19.2–21.2)	59.4	33.6
Kentucky	4,294	431,351	38.5	(35.9–41.1)	5,015	490,582	24.2	(22.2–26.2)	59.1	46.8
Louisiana	3,236	305,294	35.7	(33.5–38.0)	5,489	622,682	25.6	(24.0–27.3)	39.5	32.9
Maine	3,195	87,458	27.8	(26.0–30.0)	4,702	127,341	18.1	(16.7–19.5)	53.6	40.7
Maryland	3,007	342,250	31.8	(29.6–34.2)	5,324	640,837	20.8	(19.2–22.5)	52.9	34.8
Massachusetts	5,426	337,216	29.0	(27.2–30.9)	10,191	635,632	18.1	(16.8–19.4)	60.2	34.7
Michigan	3,916	731,565	31.9	(30.0–33.8)	5,070	1,006,178	19.6	(18.2–21.0)	62.8	42.1
Minnesota	1,669	174,151	21.1	(18.4–23.5)	3,891	447,064	14.3	(12.8–16.0)	47.6	28.0
Mississippi	4,715	259,351	40.2	(38.3–42.2)	6,142	413,807	28.5	(26.8–30.2)	41.1	38.5
Missouri	1,995	471,574	35.6	(32.7–38.6)	2,854	656,652	22.3	(20.1–24.7)	59.6	41.8
Montana	2,788	56,852	28.4	(26.3–30.6)	4,614	101,526	19.2	(17.6–20.9)	47.9	35.9
Nebraska	5,904	106,148	31.6	(29.4–33.9)	9,566	206,793	21.5	(19.9–23.2)	47.0	33.9
Nevada	1,286	152,153	32.9	(28.8–37.2)	2,451	302,414	20.9	(18.3–23.9)	57.4	33.5
New Hampshire	2,183	77,714	28.5	(26.0–31.2)	3,678	135,787	18.4	(16.7–20.3)	54.9	36.4
New Jersey	3,724	474,243	33.3	(31.3–35.4)	8,053	1,149,122	23.7	(22.3–25.2)	40.5	29.2
New Mexico	3,014	104,792	28.1	(26.2–30.2)	5,522	211,950	19.7	(18.1–21.5)	42.6	33.1
New York	2,461	1,134,249	31.2	(28.9–33.6)	4,160	2,579,591	24.4	(22.5–26.4)	27.9	30.5
North Carolina	4,880	652,940	34.7	(32.6–37.0)	8,052	1,149,456	23.3	(21.7–25.0)	48.9	36.2
North Dakota	1,694	47,509	36.1	(33.3–38.9)	2,926	81,368	23.3	(21.3–25.5)	54.9	36.9
Ohio	3,970	922,277	35.3	(33.3–37.3)	5,532	1,298,899	22.1	(20.4–23.9)	59.7	41.5
Oklahoma	3,143	329,381	40.2	(38.1–42.4)	4,528	512,183	27.4	(25.7–29.2)	46.7	39.1
Oregon	1,553	194,083	25.5	(22.7–28.6)	2,530	282,726	13.9	(12.3–15.8)	83.5	40.7
Pennsylvania	3,646	958,920	32.7	(30.6–34.8)	5,274	1,449,807	22.4	(20.8–24.1)	46.0	39.8
Rhode Island	2,491	76,681	32.4	(30.2–34.7)	3,691	124,785	21.8	(19.9–23.7)	48.6	38.1
South Carolina	4,010	363,731	35.7	(33.2–38.2)	5,542	500,050	21.7	(20.0–23.5)	64.5	42.1
South Dakota	2,377	48,045	31.9	(29.5–34.5)	4,271	96,141	22.0	(20.2–23.8)	45.0	33.3
Tennessee	1,839	508,721	42.6	(39.1–46.3)	3,497	910,316	26.7	(24.5–29.0)	59.6	35.8
Texas	3,753	1,351,921	35.1	(32.4–37.8)	7,450	3,332,025	25.1	(23.4–26.9)	39.8	28.9
Utah	3,079	103,042	25.9	(24.0–28.0)	6,837	223,531	15.3	(14.1–16.6)	69.3	31.6
Vermont	2,437	37,471	27.3	(25.3–29.5)	4,065	58,546	17.1	(15.6–18.7)	59.6	39.0
Virginia	1,818	480,796	32.3	(29.5–35.3)	3,131	773,304	18.2	(16.1–20.5)	77.5	38.3
Washington	7,609	335,125	25.8	(24.4–27.2)	12,235	617351	17.1	(16.1–18.0)	50.9	35.2
West Virginia	1,985	200,365	41.8	(39.3–44.3)	2,787	269,114	28.8	(26.7–30.8)	45.1	42.7
Wisconsin	1,497	311,778	30.2	(27.0–33.7)	2,807	571,248	18.6	(16.4–21.1)	62.4	35.3
Wyoming	2,180	30,598	28.9	(26.5–31.3)	3,708	58,098	20.2	(18.5–22.0)	43.1	34.5

* Respondents were defined as having arthritis if they reported 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?" Respondents were classified as "no LTPA" if they answered "no" to the question, "During the past month, other than your regular job, did you participate in any physical activities or exercises such as running, calisthenics, golf, gardening, or walking for exercise?" The unstandardized prevalence of no LTPA with 95% confidence intervals (CIs) was estimated for each state, by arthritis status, using sampling weights, which take into account the complex sample design, nonresponse, and noncoverage.

† Percent (%) disparity gap is the relative % difference = (% no LTPA among adults with arthritis - % no LTPA among adults without arthritis) / % LTPA among adults without arthritis × 100. The differences in prevalence of no LTPA between adults with and without arthritis were statistically significant for all 50 states and the District of Columbia ($p<0.001$).

§ Numerator = weighted number of adults with arthritis reporting no LTPA; denominator = weighted number of all adults reporting no LTPA. Percent arthritis impact = numerator / denominator × 100.

What is already known on this topic?

Physical activity improves pain management, function, and mood, and reduces disability among adults with arthritis. Despite this, adults with arthritis have high rates of physical inactivity.

What is added by this report?

In every state, adults with arthritis have significantly higher prevalence of no leisure-time physical activity (LTPA) compared with adults without arthritis. In 23 states, the prevalence of no LTPA among adults with arthritis is particularly high (≥30%). Adults with arthritis comprise a large proportion (≥33%) of all adults reporting no LTPA in every state.

What are the implications for public health practice?

To further reduce the prevalence of no LTPA in the population, adults with arthritis should be targeted with disease-specific physical activity promotion initiatives.

one state) (Figure). No state had an age-standardized prevalence of no LTPA ≥30% among adults without arthritis.

Reported by

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Editorial Note

This report describes the relatively large (approximately 53% disparity gap) disparity in prevalence of no LTPA between adults with and without arthritis. Age-standardized prevalence of no LTPA among adults with arthritis was ≥30% in 23 states; in contrast, among adults without arthritis, the prevalence of no LTPA was <30% in all states. Furthermore, adults with arthritis comprise a substantial proportion (≥33%) of all adults reporting no LTPA in each state. These results are not surprising, given that adults with arthritis have disease-specific barriers to being physically active, such as joint pain, fear of injury, concern about making their arthritis worse, and lack of knowledge concerning safe types and appropriate amounts of physical activity (*2*). However, these barriers can be addressed through targeted health communication messages; increased access to arthritis-appropriate, individually adapted behavior change programs; and relevant policy and environmental changes (*6*).

CDC provides funds to 12 state health departments to support evidence-based health communication campaigns and physical activity programs in local communities. CDC's Arthritis Program has developed and evaluated two health communications campaigns, one targeting English-speaking adults with arthritis (Physical Activity. The Arthritis Pain Reliever), the other targeting Spanish-speaking adults with arthritis (Buenas Dias Artritis). Both have been shown to reach the intended audience, increase knowledge about physical activity, and increase initiation of physical activity (*7*). All campaign materials are updated regularly, customizable, and available free of charge[§] Six structured physical activity programs[¶] have been proven safe and effective (reduced pain, improved function, improved mood, etc.) for adults with arthritis, have standardized training and evaluation, are packaged to be delivered in local communities, and can be considered examples of behavioral approaches to increasing physical activity, as defined in *The Guide to Community Preventive Services* (*6*). These group exercise programs also provide social support facilitating physical activity among adults with arthritis (*2*).

CDC's Arthritis Program is working with the Arthritis Foundation and other national organizations to identify and promote policy strategies to help expand the reach of effective arthritis-appropriate physical activity programs. For example, one third of adults with arthritis state that their local fitness centers and other local community organizations do not offer arthritis "friendly" exercise classes (e.g., low impact) or have instructors that are knowledgeable about exercising with arthritis (*2*). Organizational-level policies can address these barriers and promote increased access to effective programs. For example, parks and recreation departments can institute a policy that they offer at least one arthritis-appropriate exercise program. To address the lack of knowledgeable instructors, the American Council on Exercise, working with the Arthritis Foundation and the Association of Rheumatology Health Professionals, developed an online knowledge-based continuing education program for fitness professionals (The Fitness Professional's Guide to Training Clients with Osteoarthritis).[**] In 2012, the CDC Arthritis Program will initiate work with the American College of Sports Medicine to develop an arthritis-specific, skills-based training and certification program for fitness professionals.

The findings in this report are subject to at least four limitations. First, all information in the BRFSS is self-reported and might be prone to recall or social desirability bias. However,

[§] Additional information about the CDC Arthritis Program's health communications campaigns is available at http://www.cdc.gov/arthritis/interventions/campaigns.htm.

[¶] Additional information about CDC's evidence-based, arthritis-appropriate physical activity programs is available at http://www.cdc.gov/arthritis/interventions/physical_activity.htm.

[**] Additional information is available at http://www.acefitness.org/continuingeducation/continuingeducationcoursedetail.aspx?courseid=4a5x87w7.

among adults with arthritis, self-reported physical inactivity prevalence (44%) (*5*) is similar to accelerometer-measured physical inactivity prevalence (48%) (*4*). Self-reported physical activity also has been associated with lower rates of mortality, chronic disease, obesity, and arthritis symptoms (*3,8*), and these estimates are the most realistic to use for population level surveillance. Second, occupational, household, and transportation-related physical activities can contribute to health, but are not captured with the single LTPA question used for population surveillance (*9*). However, LTPA might be the most feasible physical activity area for most persons to modify. Despite these limitations, this study is consistent with others (*4,5*) showing that adults with arthritis have high rates (40%–50%) of physical inactivity. Third, no LTPA might result from factors other than arthritis, although arthritis symptoms (e.g., pain or fatigue) are the primary barrier to being physically active reported by adults with arthritis (*2*). Finally, BRFSS does not capture institutionalized persons or households without a landline telephone. However, data from the National Health Interview Survey showed that when landline data were weighted to match demographic characteristics of the full population, noncoverage bias generally was less than 2 percentage points (*10*).

This report used data from a large sample, which allows for reliable and precise calculation of state-level estimates. The impact measure is a function of each state's prevalence of arthritis[††] and prevalence of no LTPA. For example, DC has the second lowest prevalence of arthritis (20.8%) but a relatively high percent arthritis impact on no LTPA (31.1%). In contrast, Kentucky has the highest arthritis prevalence (35.6%) and a similarly high impact (46.8%). This is useful information for public health practice, priority setting, partnerships, and physical activity program planning at the state level because states might have similar impact but widely different arthritis prevalence.

Implementing effective communitywide campaigns with arthritis-specific messages, increasing access to arthritis-appropriate physical activity programs, and fostering policy and environmental initiatives likely to benefit adults with arthritis are essential to reducing the overall rate of no LTPA among all U.S. adults. The findings in this report suggest that, to reduce the prevalence of no LTPA among all adults, adults with arthritis are a high-need group that should be targeted with arthritis-specific physical activity promotion initiatives. Health-care providers and public health physical activity practitioners should counsel arthritis patients regarding the benefits of physical activity and refer them to physical or occupational therapy if indicated or to locally available arthritis-appropriate physical activity programs.

[††] State arthritis statistics are available at http://www.cdc.gov/arthritis/data_statistics/state_data_list.htm.

References

1. CDC. Prevalence of doctor-diagnosed arthritis and arthritis-attributable activity limitation—United States, 2007–2009. MMWR 2010; 59:1261–5.
2. Brittain DR, Gyurcsik NC, McElroy M, Hillard SA. General and arthritis-specific barriers to moderate physical activity in women with arthritis. Womens Health Issues 2011;21:57–63.
3. Kelley GA, Kelley KS, Hootman JM, Jones DL. Effects of community-deliverable exercise on pain and physical function in adults with arthritis and other rheumatic diseases: a meta-analysis. Arthritis Care Res 2011;63:79–93.
4. Dunlop DD, Song J, Semanik PA, et al. Objective physical activity measurement in the osteoarthritis initiative: are guidelines being met? Arthritis Rheum 2011;63:3372–82.
5. Shih M, Hootman JM, Kruger J, Helmick CG. Physical activity in men and women with arthritis: National Health Interview Survey, 2002. Am J Prev Med 2006;30:385–93.
6. Community Preventive Services Task Force. Promoting physical activity. In: The guide to community preventive services. Atlanta, GA: US Department of Health and Human Services, CDC; 2011. Available at http://www.thecommunityguide.org/pa/index.html. Accessed December 2, 2011.
7. Brady TJ. Moving from identifying to addressing health disparities: a public health perspective, Arth Care Res 2007;57:544–6.
8. Physical Activity Guidelines Advisory Committee. Physical Activity Guidelines Advisory Committee report, 2008. Washington, DC: US Department of Health and Human Services; 2008. Available at http://www.health.gov/paguidelines/report/pdf/committeereport.pdf. Accessed December 2, 2011.
9. Carlson SA, Densmore D, Fulton JE, Yore MM, Kohl HW. Differences in physical activity prevalence and trends from 3 U.S. surveillance systems: NHIS, NHANES, and BRFSS. J Phys Act Health 2009;6(Suppl 1): S18–27.
10. Blumberg SJ, Luke JV. Reevaluating the need for concern regarding noncoverage bias in landline surveys. Am J Public Health 2009;99:1806–10.