

# Health Related Quality of Life Among Adults Reporting Arthritis: Analysis of Data from the Behavioral Risk Factor Surveillance System, US, 1996–99

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**ABSTRACT. Objective.** To characterize health related quality of life (HRQOL) among people with and without self-reported arthritis in the general population by selected demographic and behavior characteristics.

**Methods.** We analyzed data from a cross sectional random-digit telephone survey [the Behavioral Risk Factor Surveillance System (BRFSS)] of civilian noninstitutionalized adults aged 18 years or older from 15 states and Puerto Rico, all of which used an optional arthritis survey module for one or more years from 1996 through 1999. We compared HRQOL among people with arthritis, defined as chronic joint symptoms (CJS) or doctor-diagnosed arthritis, those within one of 3 arthritis subgroups (i.e., only doctor-diagnosed arthritis, only CJS, and both doctor-diagnosed arthritis and CJS), and those without arthritis.

**Results.** On an age-adjusted basis, respondents with arthritis had significantly worse HRQOL than respondents without arthritis. Members of all 3 arthritis subgroups had significantly worse HRQOL than those without arthritis. Those with both CJS and doctor-diagnosed arthritis had consistently worse HRQOL than those with only CJS, who in turn had worse HRQOL than those with only doctor-diagnosed arthritis. In some of the demographic and behavioral subgroups, HRQOL differences between those with and without arthritis greatly exceeded the differences for the overall study.

**Conclusion.** Because many adults report arthritis and because arthritis substantially worsens their HRQOL, HRQOL measures like those in the BRFSS may be useful in monitoring the burden of arthritis and in tracking the success of population interventions for arthritis. (*J Rheumatol* 2003;30:160–6)

*Key Indexing Terms:*

ARTHRITIS

CROSS SECTIONAL SURVEY

EPIDEMIOLOGY

QUALITY OF LIFE

SOCIOECONOMIC FACTORS

Arthritis and other rheumatic conditions are a large and growing public health problem that affected 43 million people in the United States in 1997<sup>1</sup>, and with the aging of the baby boom generation will affect an estimated 60 million Americans by 2020<sup>2</sup>. These conditions constitute the most frequent cause of disability in the US<sup>3</sup>, cost \$65 billion in direct and indirect costs in 1992<sup>4</sup>, and were associated with 744,000 hospitalizations and 44 million ambulatory-care visits in 1997<sup>5</sup>. Because arthritis and other rheumatic conditions seldom cause death but have a substantial impact on health, health related quality of life (HRQOL) measures indicate their

influence better than mortality rates. In addition, HRQOL measures may also help track the success of clinical and public health interventions for arthritis.

Although HRQOL among people with arthritis has often been measured in clinical, research, and other special populations<sup>6–10</sup>, it has been measured less frequently in general populations larger than a single community<sup>11,12</sup>. Standard generic health status measures such as the Medical Outcomes Study Short-Form 36 (SF-36) and the Sickness Impact Profile (SIP) have been shown to be reliable, valid, and responsive to change in various clinical populations including people with arthritis<sup>13–17</sup>. These clinically valid measures have also sometimes been used for population assessment of HRQOL but, because of their overall length and associated respondent burden, have mostly been used for small-scale assessments<sup>18</sup> or in specialized populations<sup>19</sup>.

Measuring HRQOL in the larger, general population is important in understanding and monitoring the effects of arthritis on HRQOL because 16% of people with arthritis do not see a doctor for their arthritis<sup>20</sup>; therefore clinic based studies cannot capture the entire spectrum of disease. Beginning in the early 1990s, the Centers for Disease Control and Prevention (CDC), with advice and help from its academ-

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ic and public health practitioner colleagues, began to develop and validate a feasible set of HRQOL measures that could be used in population surveys. The product of this collaboration was a core set of 4 CDC HRQOL survey items that ask participants to rate their general health, physical health, mental health, and activity limitations. This set of survey items has been shown to be reliable, valid, and responsive to naturally occurring changes in populations<sup>21-23</sup>. It has been used to characterize the burden of disease and disability<sup>24-26</sup>; to identify unmet health and social service needs of older adults<sup>27,28</sup>; to determine the size of known or suspected health disparities by demographic, socioeconomic, and employment status; and to reflect seasonal patterns and time trends<sup>23,29</sup>.

An earlier study used data from the Behavioral Risk Factor Surveillance System (BRFSS) to characterize details of the prevalence of arthritis in 15 states and Puerto Rico<sup>30</sup>. We used the same data to characterize HRQOL among people with and without self-reported arthritis in the general population by selected demographic and behavior characteristics.

## MATERIALS AND METHODS

**Telephone survey.** The BRFSS is an ongoing state-based, random-digit dialed telephone survey, conducted by the CDC and state health departments. The BRFSS has been described in detail<sup>31</sup>. Briefly, it collects self-reported health status, demographic, behavioral risk factor, and other information from a representative sample of the civilian, noninstitutionalized population aged  $\geq 18$  years in each US state and some territories<sup>32</sup>. The BRFSS is exempt from human subjects review by the CDC Institutional Review Board because it is surveillance and not research. The study population we used for this analysis consisted of 54,154 respondents from 15 states (Alabama, Arizona, Georgia, Hawaii, Kansas, Louisiana, Mississippi, Missouri, Montana, Nebraska, New Jersey, Ohio, Oklahoma, Rhode Island, West Virginia) and Puerto Rico, all of which used a standard 6 item optional BRFSS Arthritis Module in one or more years from 1996 through 1999. HRQOL was measured by participants' responses to the following 4 item set of questions developed and validated by the CDC for use in population surveillance: (1) Self-rated health: Would you say that in general your health is excellent, very good, good, fair, or poor? (2) Recent physical health: Now thinking about your physical health, which includes physical illness and injury, for how many days during the past 30 days was your physical health not good? (3) Recent mental health: Now thinking about your mental health, which includes stress, depression, and problems with emotions, for how many days during the past 30 days was your mental health not good? (4) Recent activity limitation: During the past 30 days, for about how many days did poor physical or mental health keep you from doing your usual activities, such as self-care, work, or recreation?

**Analysis.** We calculated overall unhealthy days as the sum of physically and mentally unhealthy days, with this sum not to exceed 30 days for an individual. As outcome measures, we calculated the percentage of participants who rated their health as fair or poor, as well as participants' mean number of physically unhealthy days, mentally unhealthy days, recent activity limitation days, and overall unhealthy days.

We classified people as having arthritis if they reported having either chronic joint symptoms (CJS) or doctor-diagnosed arthritis. They were considered to have CJS if they responded yes to 2 questions: (1) During the past 12 months, have you had pain, aching, stiffness, or swelling in or around a joint? (2) Were these symptoms present on most days for at least one month? They were considered to have doctor-diagnosed arthritis if they responded yes to the question, Have you ever been told by a doctor that you have arthritis? All other respondents, including those who responded don't know, refused to answer the questions, or had missing data, were considered not to have arthritis.

Covariates included in the analyses were age, sex, race, Hispanic origin,

marital status, education, employment status, physical activity, body mass index (BMI), health care coverage or insurance, cigarette smoking, and alcohol beverage drinking. We grouped respondents into 3 age categories (18–44, 45–64, and 65+ years) and 4 physical activity categories (inactive; active, irregular and not sustained; active, regular but not intensive; and active, regular and intensive). We calculated respondents' BMI [weight (kg) divided by height (m<sup>2</sup>)] from their self-reported height and weight and grouped these values into the 4 National Institutes of Health weight classes<sup>33</sup>: underweight (BMI < 18.5), normal weight (18.5  $\leq$  BMI < 25.0), overweight (25.0  $\leq$  BMI < 30.0), and obese (BMI  $\geq$  30.0). We grouped respondents by their cigarette smoking into those who smoke daily, those who smoke some days, former smokers, and never smokers. We grouped respondents by their alcohol consumption into nondrinkers, occasional drinkers ( $\leq 29$  drinks/month), and regular drinkers ( $> 29$  drinks/month).

To account for the complex sample survey design of BRFSS, we used sample weights and SUDAAN statistical software<sup>34</sup> in estimating the 95% confidence intervals (CI) for the 5 HRQOL measures among respondents without arthritis, those with arthritis, and those in each of the 3 arthritis subgroups (i.e., those with only doctor-diagnosed arthritis, those with only CJS, and those with both doctor-diagnosed arthritis and CJS). To assess HRQOL among participants in each of these groups, we treated the HRQOL measures as continuous variables and used linear regression procedures. We also computed differences in HRQOL between those with arthritis and those without arthritis as well as differences in HRQOL among the 3 arthritis subgroups. Because both the prevalence of arthritis and the HRQOL measures among those with arthritis vary with age<sup>35</sup>, we stratified by age group or adjusted all the analyses for age (as a continuous variable) using the age distribution of the sample population. Mean group HRQOL measures in which 95% CI did not overlap were considered to be significantly different.

We used a mosaic plot<sup>36</sup> to depict the sample population stratified by age group, sex, and arthritis status; to illustrate the relative sizes and proportions of affected populations and the mean overall unhealthy days for these groups; and to identify those populations most severely affected by arthritis.

## RESULTS

Of the 54,154 respondents to the BRFSS Arthritis Module, 17,556 (32%) reported having arthritis. Of those with arthritis, 36% reported having only doctor-diagnosed arthritis, 25% only CJS, and 38% both doctor-diagnosed arthritis and CJS.

Respondents with arthritis had significantly worse HRQOL than respondents without arthritis (Figure 1). Respondents with arthritis reported having fair or poor health 3 times as often as those without arthritis (23.8 vs 7.3%), and they averaged 4.0 more physically unhealthy days, 2.3 more mentally unhealthy days, 4.9 more overall unhealthy days, and 2.3 more recent activity limitation days. All 3 arthritis subgroups had significantly worse mean HRQOL measures than the nonarthritis group (Figure 1). Those with both CJS and doctor-diagnosed arthritis had consistently worse HRQOL than those with only CJS, who in turn had worse HRQOL than those with only doctor-diagnosed arthritis.

Trends in HRQOL by demographic and behavioral variables were generally similar for those with and without arthritis (Table 1). In some of these demographic and behavioral-risk subgroups, however, HRQOL differences between those with arthritis and those without arthritis exceeded (by at least 8.0% or 0.5 days) differences for the overall study population (Table 1). Groups whose HRQOL was thus especially affected by arthritis included: those 45–64 years old, blacks and other races, Hispanics, those separated from their spouses,

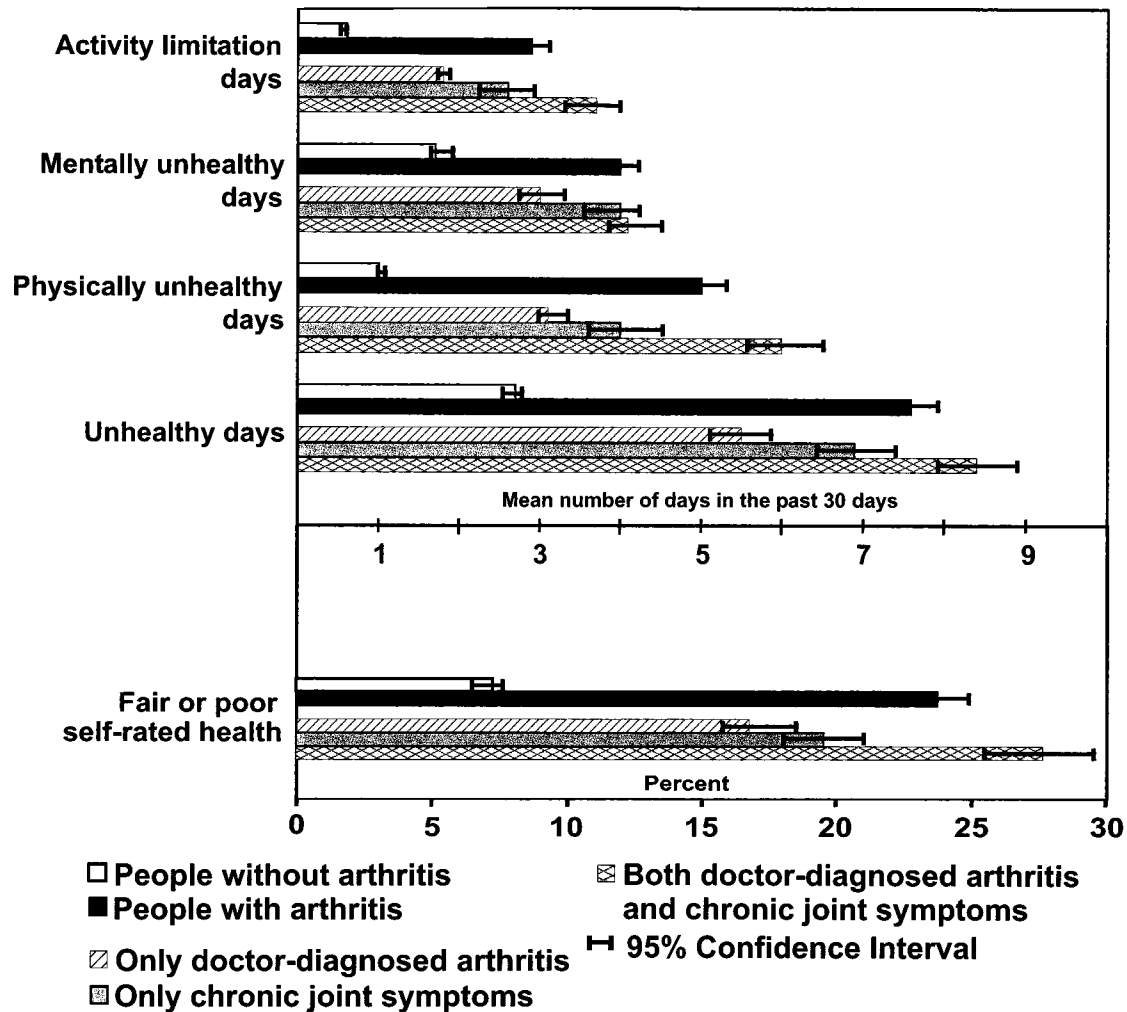


Figure 1. Days during prior month participants reported having limited activity or being unhealthy, and percentage rating of their health as fair or poor, by arthritis status and arthritis subgroup.

those with less than a high school education, those unemployed more than one year, homemakers, those unable to work, the physically inactive, those who were underweight, those who lacked health care coverage or insurance, those who currently smoke, and those who did not drink alcohol. In other complementary subgroups, the HRQOL differences between those with arthritis and those without arthritis were correspondingly much less (at least 0.5 fewer days) than expected. These groups included: whites and Asian/Pacific Islanders, those other than Hispanics, those currently married, widowed or never married, college graduates, the employed, students, the retired, those reporting regular physical activity, and those with health care coverage or insurance.

Although the proportions of respondents with only doctor-diagnosed arthritis or with both CJS and doctor-diagnosed arthritis increased substantially with age, the proportions with only CJS remained constant from 18 through 64 years old before declining at older ages (Figure 2). At all ages, women reported more doctor-diagnosed arthritis than men. Among

those without arthritis and among all those with arthritis (except those 45 years old or older with CJS only), women consistently reported more overall unhealthy days than men. Mean unhealthy days ranged from 2.6 days for men aged 45–64 years without arthritis to 12.7 days for women aged 18–44 years with doctor-diagnosed arthritis and CJS.

## DISCUSSION

In our age adjusted analysis, respondents with arthritis had significantly worse HRQOL than respondents without arthritis. All 3 arthritis subgroups had significantly worse HRQOL than those without arthritis. Those with both CJS and doctor-diagnosed arthritis had consistently worse HRQOL than those with only CJS, who in turn had worse HRQOL than those with only doctor-diagnosed arthritis. In some of the demographic and behavioral risk subgroups, HRQOL differences between those with arthritis and those without arthritis greatly exceeded the differences for the overall study.

This study has several strengths. First, because we ana-

Table 1. Percentage of those reporting arthritis\* and health related quality of life measures among people reporting arthritis (n = 17,556) and those not reporting arthritis (n = 36,598), age adjusted\*\*, by selected characteristics — Behavioral Risk Factor Surveillance System, US, 1996–99.

Characteristic	With Arthritis, %	HRQOL					
		Self-Rated Fair or Poor Health, %		Mean Number of Days During the Past 30 Days			
		Arthritis	No Arthritis	Unhealthy Days		Recent Activity Limitation Days	
				Arthritis	No Arthritis	Arthritis	No Arthritis
Age group, yrs							
18–44	16	19.7	2.4	8.9	4.1	3.2	0.8
45–64	39	31.8	7.0	9.0	3.4	3.8	0.9
≥ 65	55	40.3	18.2	7.5	3.7	3.5	1.3
Sex							
Women	26	31.3	9.3	9.2	4.4	3.5	1.1
Men	33	29.7	9.1	7.7	3.1	3.5	0.9
Race/ethnicity							
White	31	22.2	4.1	7.3	3.7	3.1	0.8
Black	28	36.8	12.3	9.5	4.2	4.6	1.1
Asian/Pacific Islander	14	21.9	5.3	6.3	2.6	2.6	0.6
American Indian/Alaska Native	29	34.3	13.0	10.2	3.9	3.4 <sup>†</sup>	1.6 <sup>†</sup>
Other	18	37.3	11.1	9.0	4.4	3.8	1.0
Hispanic ethnicity							
Hispanic origin	22	39.4	13.4	8.9	3.8	3.8	1.2
Non-Hispanic origin	31	21.6	5.0	8.0	3.7	3.2	0.8
Marital status							
Married	31	22.5	4.1	6.3	2.4	2.2	0.5
Divorced	35	29.1	8.7	8.8	4.1	3.9	1.2
Widowed	56	29.0	10.4	7.5	4.1	2.9	1.2
Separated	32	41.9	11.6	11.7	4.6	4.7	1.2
Never married	14	27.0	9.6	7.1	3.1	2.7	0.9
Unmarried couple	21	33.6	10.6	9.4	4.1	4.6	1.0
Education level							
Less than high school	43	50.9	19.4	11.5	4.7	5.4	1.5
High school graduate or some college	30	26.4	6.5	8.0	3.7	3.2	0.9
College graduate	22	14.3	1.5	5.9	2.9	1.9	0.6
Employment status							
Employed for wages	22	14.2	0.7	3.7	1.5	0.4	0.0
Self-employed	25	10.2	0.0	4.3	1.4	0.7 <sup>†</sup>	0.0 <sup>†</sup>
Out of work > 1 year	34	41.4	14.2	13.6	4.5	6.2	1.6
Out of work < 1 year	23	29.2	8.9	11.2	4.7	4.3	1.7
Homemaker	33	32.3	5.9	6.5	2.4	2.3	0.7
Student	9	16.7	2.2	3.5 <sup>†</sup>	1.3 <sup>†</sup>	0.0 <sup>†</sup>	0.2 <sup>†</sup>
Retired	53	28.6	10.6	5.9	2.2	2.5	0.6
Unable to work	69	73.7	50.7	19.1	11.9	13.6	8.2
Physical activity							
Inactive	35	42.2	13.3	11.2	4.3	5.6	1.4
Irregular, not sustained	27	28.9	8.3	7.9	3.6	3.2	0.9
Regular, not intensive	25	23.0	6.6	7.0	3.6	2.4	0.9
Regular, intensive	29	19.3	4.7	6.3	3.0	2.0	0.6
Body mass index							
Underweight	22	40.8	10.9	10.6	4.4	5.3	1.6
Normal	24	21.7	5.9	7.0	3.7	2.4	0.7
Overweight	30	23.8	6.7	7.0	3.0	2.6	0.6
Obese	43	35.5	12.7	9.2	4.2	3.6	1.1
Health care coverage or insurance							
Yes	31	23.5	5.9	6.7	3.2	2.9	0.8
No	25	37.6	12.5	10.2	4.3	4.1	1.2
Smoking status							
Current, every day	32	37.7	11.9	10.4	4.3	4.3	1.1
Current, some days	25	31.0	9.9	9.4	4.7	4.7	1.3
Former	40	27.7	7.8	7.1	3.3	2.6	0.9
Never	25	25.9	7.1	7.0	2.8	2.4	0.7
Alcohol drinker							
Non-drinker	34	43.4	13.1	10.8	3.7	5.2	1.2
≤ 29 Drinks/mo	25	25.2	7.3	7.6	3.8	2.8	1.0
> 29 Drinks/mo	25	27.6	9.9	8.0	4.3	3.1	1.1

\* Persons with arthritis were defined as those having either chronic joint symptoms or doctor-diagnosed arthritis.

\*\* Using age as a continuous variable, except for age-group analyses.

† In these comparisons, those with arthritis did not have significantly worse HRQOL than those without arthritis. In all other comparisons, those with arthritis did have significantly worse HRQOL.

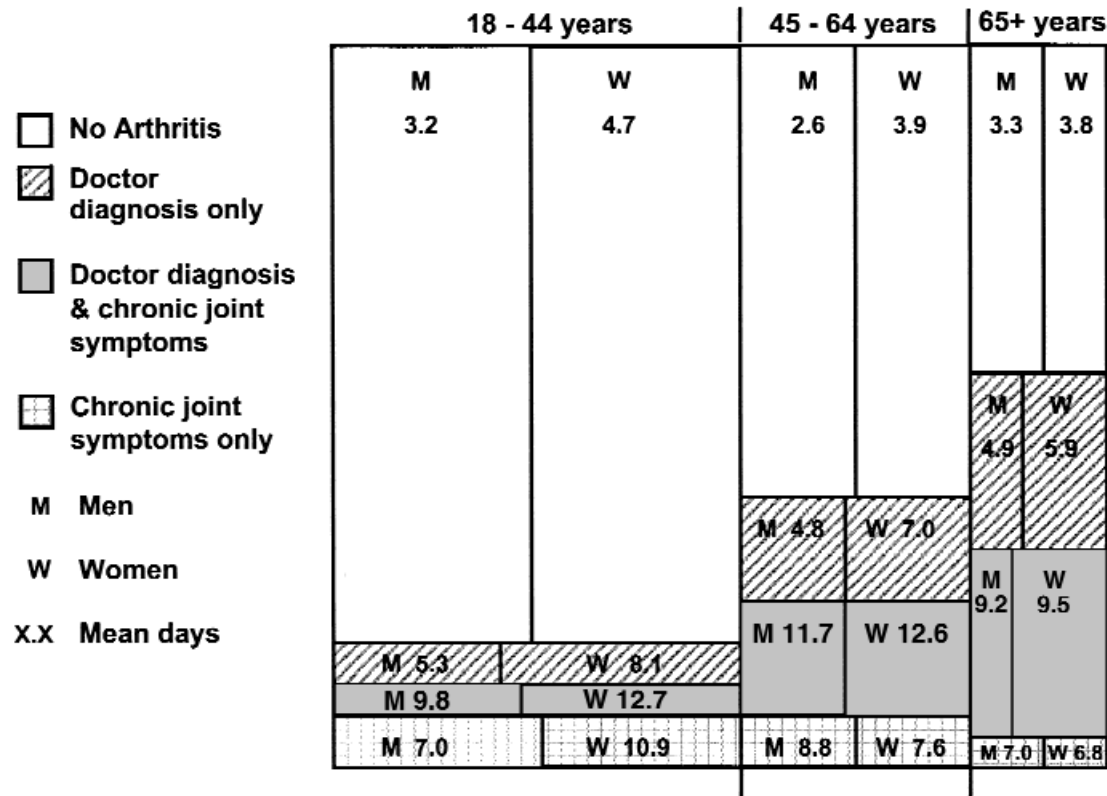


Figure 2. Proportions of adults by age group, sex, and arthritis status and the mean number of unhealthy days for each subgroup, 1996-99 BRFSS (15 states and Puerto Rico). Areas of the mosaic correspond to the proportions these strata represent in the BRFSS states included in this study.

lyzed state based population survey data, our results are generalizable to the populations surveyed. Second, because the CDC HRQOL measures used here have been validated by CDC and others for use in population surveillance<sup>21-23,37,38</sup>, they can be confidently used to describe the nature and extent of the perceived health and activity limitation burden associated with different subgroups of arthritis in different populations. This standard CDC HRQOL 4 item set correlated well with related SF-36 scales both in general community populations<sup>37</sup> and among adults with known disabilities<sup>39</sup>. It has also been acceptably validated in cognitive studies conducted among elders by the National Center for Health Statistics<sup>40,41</sup>. In addition, it has been found to predict rates of mortality, hospital utilization, and outpatient visits among low income elderly people<sup>42-44</sup>. Third, because the BRFSS combines data from identical state based surveys to create a large sample, the estimates of HRQOL among people with arthritis and among subgroups of people with arthritis derived from it are more precise than those based on smaller samples. Fourth, by examining HRQOL for the 3 subgroups of people with arthritis and for various demographic groups, we were able to identify high risk groups. Fifth, the large sample size allowed us to identify age and sex-specific HRQOL differences for better targeting of interventions.

This study also has several limitations. First, the BRFSS case definition for self-reported arthritis has not yet been val-

idated, although validation studies are under way. The more comprehensive definition of arthritis in this report (people with CJS or doctor-diagnosed arthritis), however, may better identify those with arthritis and other rheumatic conditions than a previous case definition that included only those with CJS<sup>45,46</sup>. Second, because the BRFSS does not ask about many other common chronic health conditions that affect people's HRQOL, we could not adjust for these conditions. Third, because the BRFSS excludes people without telephones, those in the military, those in institutions (for example, nursing homes), and those younger than 18 years, the data do not represent the entire population in these states and thus underestimate the total number affected by arthritis. Fourth, because the time and functional capacity required to complete the BRFSS may limit participation by people with arthritis who have poor health and functional limitations, our data may underestimate the proportion of people with poor HRQOL. Fifth, unhealthy days may be overestimated for people who report both physical and mental unhealthy days when these days overlap. Sixth, no published studies have examined how these HRQOL measures change over time or how these measures among people with arthritis are affected by clinical and public health interventions. Finally, the states using the BRFSS arthritis module may not be representative of other states.

The substantial detrimental effect that arthritis has on



HRQOL, especially after age 45 years, suggests the importance of identifying potential public health interventions. Older people and those in other groups whose HRQOL was disproportionately affected by arthritis may need interventions to reduce barriers to effective arthritis treatment such as lack of insurance, cost of treatment, distance from treatment, and lack of transport. Because most of the burden from only CJS occurs among those 18–44 years old, CJS may represent subacute effects of injury associated with occupation or life style. Identifying specific causes of only CJS might lead to interventions to prevent future arthritis or reduce its effect or severity. For example, 16% of people with arthritis in the National Health Interview Survey had not seen a doctor for their arthritis<sup>20</sup>. Compared with those who saw a doctor for their arthritis, these people were less likely to be overweight or not have health insurance, and more likely to be male, younger, and to have better self-perceived health and fewer activity or work limitations due to arthritis<sup>20</sup>.

Because arthritis substantially affects people's health, using HRQOL measures like those in the BRFSS may be useful in monitoring the effect and the burden of arthritis and in identifying high risk groups for targeted interventions such as the Arthritis Self-Help Course<sup>47</sup>, which helps people with arthritis to decrease their pain and number of physician visits. The Arthritis Foundation estimates, however, that these interventions reach less than 1% of the target population<sup>48</sup>. Other interventions may include water and land exercise, social support, and improved access to health care services.

Further research is needed to determine the specific effect of arthritis and disability on HRQOL after controlling for other factors, such as common chronic health conditions or low socioeconomic status<sup>49</sup>. Longitudinal studies are also needed to examine how these HRQOL measures of people with arthritis change over time and respond to clinical and public health interventions. Such research could improve current clinical and public health interventions developed for people with arthritis, and guide efforts in reaching the Healthy People 2010<sup>50</sup> goal of increasing the quality and years of healthy life for people with arthritis.

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