LOIS M. VERBRUGGE, PHD MPH ■ LUCIA JUAREZ, MA

Profile of Arthritis Disability

SYNOPSIS

Using the 1994–95 National Health Interview Supplement Disability Supplement, the authors study levels of disabilities and accommodations among US adults with arthritis disability, compared to people with disability due to other conditions.

Arthritis-disabled people are defined in two ways. One definition covers a broad range of arthritis and rheumatic conditions, and the other concentrates solely on arthritis.

The authors find that arthritis-disabled people have more total disabilities than other-disabled people. However, their disabilities are less severe, have shorter durations, and accumulate more gradually over time. Despite more disabilities, people with arthritis disability use fewer assistive and service accommodations than other-disabled people. They do use more mobility aids.

Because arthritis is the leading chronic condition for middle-aged and older adults, this profile of extensive but mild-to-moderate disability is experienced by many millions of adults. Accommodations for arthritis may also be extensive but aimed more toward self-care than toward assistive and medical services.

Both authors are with the Institute of Gerontology, University of Michigan, Ann Arbor. Dr. Verbrugge is a Distinguished Senior Research Scientist; Ms. Juarez is a Research Associate II.

Address correspondence to:
Dr. Verbrugge, Institute of Gerontology, 300 North Ingalls, University of Michigan, Ann Arbor MI 48109-2007; tel. 734-936-2103, fax 734-936-2116, e-mail <verbrugg@umich.edu>.

Arthritis is the preeminent chronic condition of mid and late life in the US population. For middle-aged and older women, its prevalence outranks all other fatal and nonfatal conditions. For men, arthritis is near top prevalence at ages 45–64 and becomes the first-rank chronic condition at ages 65 and older.[1-7] The population burden of arthritis disability is also very high: arthritis is the most often cited reason for activity limitations by middle-aged and older women, and it ranks first or second for men at those ages.[5-6,8] Together, high prevalence and frequent disability are the underpinnings for the large economic and health services impacts of arthritis.[9-12]

In this paper, we study levels of disability and accommodations among US adults with arthritis disability. Disability is studied in the domains of personal care (ADL), household management (IADL), physical limitations (PLIM), sensory or communication limitations, and cognitive or emotional limitations. The accommodations are assistance for ADLs and IADLs, and specialized equipment and services.

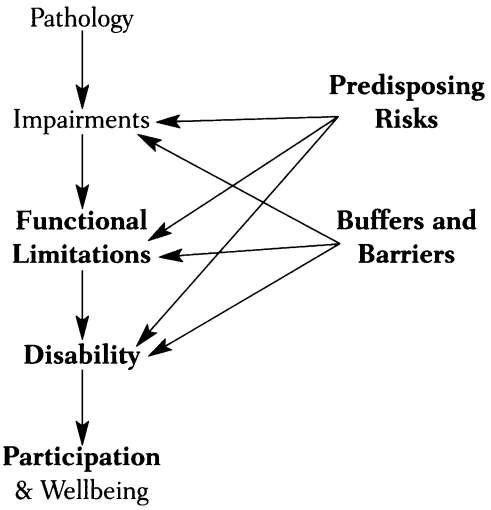
To detect special problems that arthritis-disabled people have, we compare their levels of disability and accommodations to other-disabled people (whose disabilities are due to other conditions). We anticipate that arthritis-disabled people have more disabilities, but milder and more gradual ones, than other-disabled people. We also expect that arthritis-disabled people use more accommodations, compared to less use and more needs among other-disabled people.

BACKGROUND

The disablement process. We draw on a general conceptual scheme called the disablement process.[13-16] The scheme describes the central process of disablement, factors that influence the pace and extent of disablement, and global outcomes of disability.

The scheme has a main pathway of how chronic and acute conditions (Pathology) prompt symptoms in and affect the functioning of specific body or mind systems (Impairments), thereby leading to problems in performing basic physical and mental actions (Functional Limitations), and eventually causing difficulties in performing social roles and activities (Disability). The pace of disablement over time and levels of dysfunctions at a given time are affected by personal and environmental features. On the personal side, Predisposing Risks are longstanding characteristics of individuals that affect level and pace of dysfunctions (impairments, functional limitations, disability). On the environmental side, *buffers* are adaptations being used to reduce dysfunctions and slow the pace of disablement; examples are a cane, a visit to a medical doctor, or physical therapy. *Barriers* are accommodations needed but not present; the needs are sometimes perceived, sometimes not, by the person with disability. Disablement can affect general aspects of a person's life, such as feelings of social integration, role involvement, happiness, and community or institutional residence.

The conceptual scheme is portrayed here, with the topics of this analysis in boldface:



Empirical research on the disablement process has concentrated on the main pathway from pathology to disability, and how personal characteristics affect disability presence and changes.[17-26] The most commonly studied global outcomes are employment status for young and midlife adults, and institutionalization or death for older adults.

Multiple disabilities. Just as diseases often come in multiples (co-morbidity), so do disabilities. Yet most research on disability has focused on particular dysfunctions (for example, difficulty in dressing). This is certainly important for estimating assistance and service needs, but it bypasses the real-life experience of disability. A person approaches each day with his or her combination of problems in mind and makes adaptations to help all of them. Here, we measure disabilities as multiples, with indicators ranging from simple counts to more complex indexes and patterns.

Environmental factors. Disability research often has a person-based perspective, viewing disability as a personal characteristic caused by health problems. This has been

shaken up in recent years by advocacy groups that claim disability is an environmental issue, either entirely (that is, social and physical barriers are the sole cause of disability) or in part (both personal and environmental factors figure in disability). A recent Institute of Medicine report aligns with the latter, adopting a *person-environment* viewpoint.[27] Measuring buffers and barriers is a knotty matter for empirical research. Two approaches are being tried: first, asking subjects if environmental features inhibit or facilitate them or, second, asking subjects about use and need for specific physical and social features. The first works well for people with severe or lifelong disabilities who are indeed aware of environmental issues. The second works well in broad population surveys, since most lay people do not think readily about environmental causes of their disabilities. Our dataset follows the second approach; it includes items about use of and needs for accommodations.

Hypotheses. We test three hypotheses. 1) *Arthritis-disabled people have more disabilities but generally less severe ones, than other-disabled people*. The rationale is that arthritis often affects multiple joints, sometimes in both upper and lower extremity locations. Thus, many activities are affected. Further, arthritis symptoms vary in timing and intensity for a person, and they are focused in the region of the joints and adjacent bones. Because arthritis is largely nonfatal, symptoms are less frightening than for fatal conditions. In short, although symptoms are a prominent feature of arthritis, they tend to limit activities in mild or moderate ways. 2) *Disability onset is more gradual for arthritis-disabled people than for other-disabled people*. The typically slow development of arthritis implies that disability onsets will also be gradual, spaced out over time as a person ages. 3) *Arthritis-disabled people use more accommodations (buffers), and they have fewer additional needs for accommodations (barriers), than other-disabled people*. The rationale is that accommodations for physical problems are diverse and available, and many of them are inexpensive. This boosts use and diminishes unmet needs for arthritis-disabled people.

METHODS

Data source. The Disability Supplement to the 1994–95 National Health Interview Survey (NHIS-D) is the first large-scale probability sample survey of disability for US community dwelling persons of all ages. Other large-scale surveys have studied disability in specific age or service groups, or covered the topic briefly in national samples. NHIS-D's combination of broad age scope, large probability sample, and in-depth focus on disability is unprecedented.

NHIS-D was designed to study disability prevalence, demographic and social risk factors for disability, and service use and economic outcomes for persons with disabilities. The survey emerged from programmatic needs of several federal agencies with policies and programs for persons with disabilities. These include the Assistant Secretary for Planning and Evaluation, Health Care Financing Administration, Substance Abuse and Mental Health Services Administration, Administration on Developmental Disabilities, Administration on Aging, Social Security Administration, and Department of Education. All wanted population-based data, rather than program-based data, for specific disability groups. Further, the passage of the Americans with Disabilities Act in 1990 underscored the need for national monitoring of disability. Combining their interests and funds, these and several other agencies commissioned the National Center for Health Statistics (NCHS) to design and conduct a national disability survey as a supplement to the National Health Interview Survey.

The National Health Interview Survey (NHIS) is a continuous survey of health of the civilian non-institutional population of the US conducted by the federal government since 1957. Each year, personal interviews are conducted in a probability sample of households about the health of all household members. In the mid-1990s, data were collected annually for approximately 49,000 households and 127,000 persons. With this large sample size, NHIS can produce reliable national estimates of numbers of persons with specific health features in age-gender-race subgroups. Sampling design is described in annual reports for NHIS (Vital and Health Statistics, Series 10, Current Estimates issues) and in a special methodology report.[28]

The Disability Supplement was conducted for the two years, 1994 and 1995, in order to provide estimates for low-prevalence disability groups. NHIS-D had two stages. Phase One was conducted at the same time as the NHIS Core questionnaire. It contains disability information for all household members. Typically, the data are reported by a knowledgeable adult member of the household. Phase One provides national estimates of disability status, and it also serves as a screener for identifying disabled persons for a follow-up interview. The 1994 Phase One sample size is 107,469 persons; response rate (percent of NHIS sample persons for whom Phase One data exist) is 87%. The 1995 sample is 95,091 persons; response rate 87%. Adults (ages 18 years and older) num-

ber 77,437 in 1994 and 67,570 in 1995. Phase Two, also called the Disability Follow-up Survey, is a subsequent interview for screened-in persons with disabilities. It contains very detailed questions about disability experience and services. Analyses of Phase Two data are being performed currently and will be available elsewhere.

Questionnaires for NHIS Core and NHIS-D are printed in Vital and Health Statistics, Series 10, No. 193 and also available on the NCHS website (**http://www.cdc.gov/nchs**). All data files for NHIS-D have been issued. A compact inventory of variables is available.[29]

For this analysis, we use 1994–1995 Phase One data for adults. Our estimates pertain to the midpoint (average) of the two years.

Arthritis-disabled people. We select people with disability who say arthritis is the main cause of one or more disabilities. All of their disabilities are studied. (Other options we considered were first, the same people but counting only their arthritis-caused disabilities, or, second, people with arthritis who have disability, ignoring whether arthritis is named as a cause. Our choice is attractive because it maintains a whole-person view of disabilities and confirms that arthritis is a cause of disability.

Arthritis-disabled people can have other disabling conditions besides arthritis. We take arthritis as it exists in the US population, sometimes combined with other disabling conditions, sometimes not. Consequently, the analysis does not measure "pure" arthritis effects, as clinicians do in samples of patients with just arthritis.

We describe the disease codes and the disabilities used to identify arthritis-disabled people:

ICD Codes for Arthritis. All conditions reported in NHIS-D are coded to the International Classification of Diseases (ICD), 9th Revision, Clinical Modification, with NCHS modifications.[30-31] Condition information in NHIS-D is based on self-reports that are extensively probed for details by the interviewers. Skilled medical coders assign an ICD code to each condition. They take great effort to reach specific ICD codes, but many conditions necessarily get nonspecific ones (for example, 716.9 for "Arthropathy, unspecified"). The quality of NHIS condition reports is evaluated in an NCHS methodology publication.[32]

We analyze two groups of conditions, one based on a broad capture of arthritis and rheumatic conditions, and the other based on a more focused capture of arthropathies.

Arthritis and Other Rheumatic Conditions. The National Arthritis Data Workgroup (NADW) was organized by the National Institute of Arthritis and Musculoskeletal and Skin Diseases, National Institutes of Health, to help standardize definitions of arthritis. The Workgroup chose a broad set of titles for Arthritis and Other Rheumatic Conditions.[33] The set includes common arthropathies (osteoarthritis, rheumatoid arthritis, ankylosing spondylitis and other axial forms) and rare ones (such as infectious and crystal forms); common rheumatic and connective tissue conditions (lupus, bunion, disorders of synovium, tendon, or bursa) and rare ones (such as infectious myositis, polymyalgia rheumatica); nonspecific rheumatism and fibromyalgia; and other-system diseases with prominent joint or connective tissue manifestations (such as gout, carpal tunnel syndrome, Raynaud's syndrome). Each type can range from mild to severe. Excluded are musculoskeletal conditions such as low back pain syndrome, fractures, osteomyelitis, chondromalacia, deformities, and osteoporosis. The ICD codes are listed below Table 1. The Workgroup recommends that researchers use its codespan for estimates of arthritis prevalence and societal impact.[33]

Arthritis. The National Center for Health Statistics (NCHS) designates six groups of arthritis and rheumatic conditions for national prevalence calculations, based on the National Health Interview Survey. They are: Arthritis, Rheumatism, Gout, Bone Spur or Tendinitis, Bunion, and Bursitis. The ICD codes for these groups are all contained within the NADW span of conditions. The Arthritis group includes all arthropathies, namely, osteoarthritis, rheumatoid arthritis, ankylosing spondylitis and other axial forms and rare forms. Again, each type can range from mild to severe. The ICD codes are listed below Table 1. For several decades, national prevalence rates of arthritis have been based routinely on NHIS data and this definition.

Each approach has its own special value. The NADW's broad capture gives a fine view of "arthritis" as a major health problem of the US population. It is good for public health advocacy and for comparisons with broad-capture estimates made for other diseases, done also for advocacy reasons. By contrast, the NCHS approach gives estimates for a well-defined set of conditions, and it is widely used and seen in national statistics.

Disabilities. In NHIS-D Phase One, 29 specific disabilities have a follow-up question about the main condition that causes the disability. Twelve of the disabilities are just for children (younger than 18 years old), so they are not germane to our analysis. Seventeen disabilities are asked of adults (ages 18 and older). They relate to personal care

Table 1. Rates of arthritis disability and other disability among community-dwelling adults, US 1994–1995

	With disability (N = 27,541.7)	*Arthritis and Rheumatic Conditions disability[a] (N = 4638.2)*	*Arthritis disability[b] (N = 3819.9)*	*Other disability (N = 22,903.5)*	*No disability (N=117,465.3)*
Adults ages 18 *years and older*					
Prevalence among all adults (percent) (N = 145,007.0)	18.9	3.20	2.63	15.79	81.01
Standard error[c]	±0.18	±0.06	±0.05	±0.16	±0.18
Prevalence among adults with disability[d] (percent)		16.84	13.87	83.16	
Standard error[c]		±0.26	±0.24	±0.26	
Age-specific rates					
Prevalence among all adults for ages:			*Percent*		
18–24		0.2	0.1	6.2	
25–34		0.5	0.2	8.8	
35–44		1.4	0.8	12.0	
45–54		2.7	1.8	16.0	
55–64		5.2	4.5	21.0	
65–74		8.4	7.7	27.9	
75–84		13.3	12.5	39.5	
85+		15.6	14.7	57.2	
Prevalence among adults with disability for ages:					
18–24		3.9	1.8	96.1	
25–34		5.8	2.4	94.2	
35–44		10.6	5.9	89.4	
45–54		14.3	9.6	85.7	
55–64		19.9	17.1	80.1	
65–74		23.2	21.3	76.8	
75–84		25.2	23.7	74.8	
85+		21.4	20.2	78.6	

SOURCE: National Health Interview Survey Disability Supplement, National Center for Health Statistics, pooled years 1994–1995

NOTE: Data are weighted to be representative of the civilian non-institutional population, ages 18 years and older. Shown above are weighted sample sizes for each group.

[a]International Classification of Diseases (ICD), 9th Revision, Clinical Modification codes for Arthritis and Other Rheumatic Conditions are: 95.6, 95.7, 98.5, 99.3, 136.1, 274, 277.2, 287.0, 344.6, 353.0, 354.0, 355.5, 357.1, 390, 391, 437.4, 443.0, 446, 447.6, 696.0, 710–716, 719.0, 719.2–719.9, 720–721, 725–727, 728.0–728.3, 728.6–728.9, 729.0–729.1, 729.4. A 3-digit number includes all fourth digits (.0–.9).

[b]ICD codes for Arthritis are: 711.b,0,9; 712.b,8,9; 714–716, 720.0, 721. A 3-digit number includes all fourth digits (.0–.9); b = blank.

[c]SUDAAN software is used to calculate standard errors.

[d]"Adults with disability" have one or more of 17 specific disabilities, relating to personal care (ADL) or household management (IADL) difficulty due to health, physical limitations (PLIM), sensory or communication limitations, cognitive or emotional limitations, and receipt of physical or occupational therapy in the past year.

(ADL) and household management (IADL) difficulties due to health, physical limitations (PLIM), sensory or communication limitations, cognitive or emotional limitations, and receipt of physical or occupational therapy in past year. We call them *target disabilities*. For the 17 target disabilities, we scan their condition variables for the two arthritis spans (NADW, NCHS). A person is plucked for an arthritis-disabled group if any of his or her target disabilities has an ICD code in the designated span.

Raw sample sizes of arthritis-disabled people are 4,779 people for the NADW span and 3,944 for the NCH span. The second group is contained in the first; in fact, the great majority of people with Arthritis and Other Rheumatic Conditions disability have Arthritis disability (83%).

In the Results, we refer to the two groups by A&RDisab for Arthritis and Other Rheumatic Conditions disability, and ArthDisab for Arthritis disability. In the tables, their names are spelled out more fully.

Other-disabled people. People with disabilities not due to arthritis are chosen for a comparison group. Operationally, we choose the people whose disabilities are all attributed to conditions outside the NADW codespan, and call them "other-disabled" people. This is a heterogeneous group; all sorts of conditions prompt their dysfunctions. Together, arthritis-disabled people (NADW) plus other-disabled people constitute the total population of persons with disabilities.

Raw sample size of other-disabled adults is 23,373. In the Results, they are labeled OthDisab.

Variables. We describe the NHIS-D questionnaire items and the generated variables used in this analysis.

Sociodemographic, health, and social participation characteristics. Sociodemographic features are age, sex, race/ethnicity, and education. Health is represented by counts of chronic conditions and of disabling conditions, and self-rated health. Social participation refers to involvement and integration in one's community. We study two facets of participation, the person's main role activity, and whether he or she is considered a disabled person by self or others. The first is objective and the second is subjective, thereby giving different perspectives of participation.

Disabilities. There are five domains of disability and limitations: personal care, household management, physical abilities, sensory or communication abilities, and cognitive or emotional abilities. The Phase One survey asks about health-related difficulty in 6 *personal care* activities (ADLs: bathing or showering, dressing, eating, getting in and out of bed or chairs, using toilet including getting to toilet, getting around inside home) and 6 *household management* activities (IADLs: preparing own meals, shopping for personal items, managing money, using telephone, doing heavy housework, doing light housework). People are scored as disabled if they have health-related difficulty. For ADLs, this includes people who report difficulty doing the task on their own, or who use personal or equipment assistance due to health. For IADLs, it is difficulty on one's own or having personal assistance due to health. Respondents also are asked about difficulty in 8 *physical* abilities (PLIMs: lifting 10 pounds, walking up 10 steps without rest, walking a quarter mile, standing 20 minutes, bending down from upright to pick up object, reaching up over head or reaching outward, using fingers to grasp or handle, holding pen or pencil); 9 *sensory or communication* abilities (seeing, hearing, communicating, understanding, learning, dizziness, balance, sense of smell, sense of taste); and 7 *cognitive or emotional* abilities (frequently depressed or anxious, trouble making or keeping friendships, trouble getting along with others in social or recreational settings, a lot of trouble concentrating long enough to complete everyday tasks, serious difficulty coping with day-to-day stresses, frequently confused, disoriented, or forgetful, have phobias or unreasonably strong fears).

Degree of difficulty is queried for all domains, except the cognitive-emotional domain. The difficulty questions measure intrinsic severity of disability, that is, difficulty on one's own. (Assisted people are asked what their difficulty would be in that situation). Age at first onset is asked for each ADL, IADL, and PLIM, but without detail or not at all for the other domains. We calculate duration of each disability by subtracting age at first onset from current age. Any periods of remission are unknown; so we view the duration variable as a measure of lifetime experience and concern for the disability.

Role limitations are asked for a person's major activity in past year (work, keeping house, school, something else), and also specifically for work (everyone ages 18–69, regardless of major activity).

Accommodations. Buffers are accommodations being used for disability. For ADLs and IADLs, respondents are asked if they have personal assistance (hands-on or supervision) for each activity due to health problems. For ADLs, equipment assistance is also queried. Elsewhere in the questionnaire there are questions about use of special equipment for sensory and mobility problems (partic-

ular types of equipment are named), and rehabilitation and mental health services in the past year.

Barriers are needs for accommodations for home, job, or transportation disabilities. Phase One has just a few items about barriers, namely, if certain social services are needed.

Generated variables. We created variables to represent volumes and combinations of disabilities and accommodations. Conceptually they are all measures of multiplicity. First, for each disability domain, we have a count of disabilities, their average severity and average duration, longest duration, their timing (whether onsets were all-at-once or gradual, based on reviewing the ages at onset for a person's disabilities), and the specific combination of disabilities (perfect hierarchy, a formal pattern in which any given disability is always accompanied by all higher prevalence ones). Second, for accommodations, we use counts of buffers and barriers in the domains, and an index of ADL assistance.

Procedures. We make estimates of disabilities and accommodations for three groups (A&RDisab, ArthDisab, OthDisab) and compare them. The estimates are means and percents in each group. Statistical comparisons use F tests (ANOVA) or chi-square tests (crosstabulations), as appropriate.

NHIS-D has a multistage, stratified, cluster probability sample of US households. This affects point estimates and variances for those estimates. For point estimates, NCHS provides weights that adjust for sample design and non-response, so the estimates are representative of the US civilian non-institutional population. For variances, special statistical software is needed to obtain correct variance estimates; we use SUDAAN 7.5.3.[34] The NHIS sampling design changed in 1995, which complicates using weights and calculating complex variances; NCHS staff provide on request some programming guidelines for pooled-year analyses.

Missing data are handled as follows: Not Ascertained, Don't Know, and Refused responses are recoded to the mode. An exception is age-of-onset; we devised a complex imputation procedure to assign the most likely age of onset.[35] Inapplicable cases are excluded.

RESULTS

We present rates of arthritis disability (A&RDisab, ArthDisab) and other disability (OthDisab). Then we compare levels of sociodemographic features, health, social participation, disabilities, and accommodations for the three groups.

Rates of arthritis disability and other disability. One-fifth of US community-dwelling adults have disability (19.0%, see Table 1). Three percent of all adults have disability due to arthritis and other rheumatic conditions (3.2%, A&RDisab), 2.6% have disability due to arthritis (ArthDisab), and 15.8% have disability due to other conditions (OthDisab). Among all adults with disabilities, A&RDisab people make up 16.8%, ArthDisab make up 13.9%, and the rest (83.2%) attribute their disabilities entirely to other conditions.

We computed prevalence rates of arthritis disability and other disability by age, gender, race, and education for all adults. The rates of each disability rise with age (see Table 1). Females have higher arthritis disability rates than males, but the genders have comparable rates of other disability. Looking at age-sex groups, arthritis disability is greater for women than men at every age. By contrast, other disability is distinctly greater for men than women from mid to late life, from ages 35 to 85. White non-Hispanic and black people have higher rates of arthritis disability and other disability than white Hispanic and Other groups. Disability rates tend to decline as educational attainment rises. (The rates for sex, age-sex, race, and education are not shown; they are available from the corresponding author on request.)

For readers especially interested in arthritis disability rates, we provide this note: How do our rates of arthritis disability compare with those prepared by the National Arthritis Data Workgroup?[33,36] The Workgroup computed percent of total US population "with arthritis activity limitation" based on the 1989–1991 NHIS. Our overall rate of 3.2% for A&RDisab is above the Workgroup's rate of 2.8%, due mostly to our use of Adults as the denominator and their use of All Ages (a larger denominator). It is better to make comparisons of age-specific rates. The Workgroup's age-specific rates (see their Table 1, Activity limitation, Crude[33]) are greater than or equal to our rates in Table 1. The differences probably occur because we have more specific coverage of disabilities and causes. We use 17 specific disabilities and arthritis named as main cause versus the Workgroup's choice of major activity limitation as the disability variable, and arthritis as main or secondary cause. Changes in rates over the short time between the two data series is unlikely. We note, finally, a comparison that should not be made in the two analyses. Arthritis prevalence among disabled adults, 16.8% in NHIS-D, cannot be compared to the Workgroup's preva-

lence of disability among persons with arthritis, 18.4% in NHIS. The two percents have the same numerator (arthritis-related disability), but different denominators (total disabled people for NHIS-D; total arthritis people for NHIS).

Sociodemographic characteristics of disabled people. The total US adult population is (on average) middle age, about half female, predominantly white, with moderate education (Table 2). US adults generally have few health problems, high work participation, and little self-perception as disabled.

The three disability groups (A&RDisab, ArthDisab, OthDisab) are very different from that. They are notably older and more female than All Adults, have substantially more health and disability problems, lower work participation, and higher levels of self-perception as disabled (Table 3). (For completeness, characteristics of people with no disability are shown; we do not discuss them further.)

Group comparisons. Results of tests for general group differences are displayed in Table 3. They show if any difference exists among the three groups: for A&RDisab, OthDisab, NoDisab, and for ArthDisab, OthDisab, NoDisab. Most of the general comparisons are highly significant ($P \leq 0.001$). Tests of pair-wise differences look for differences between two groups: A&RDisab versus OthDisab, and ArthDisab versus OthDisab. The pair-wise tests are the most crucial ones

Table 2. Sociodemographic, health, and participation characteristics of community-dwelling adults, US 1994–1995

	Mean	Percent
Sociodemographic		
Age (years)	44.3	
55 years or older		27.3
Female		52.2
Females 55 years or older		15.3
White non-Hispanic		75.7
Education (years)	12.7	
High school or more		81.1
Health		
Chronic conditions per person[a]	0.91	
People with one or more chronic conditions		45.8
Target disabling conditions per person[b]	0.25	
People with one or more target disabling conditions		19.0
Total disabling conditions per person[c]	0.49	
People with one or more disabling conditions		25.7
Excellent/very good self-rated health		62.2
Fair/poor self-rated health		13.2
Social participation		
Major activity in past year is work[d]		62.0
Major activity in past year is not job-related[d]		31.7
Considered disabled by self or others		9.1

SOURCE: National Health Interview Survey Disability Supplement, Phase One, National Center for Health Statistics, pooled years 1994–95.

NOTES: Data are weighted to be representative of the civilian non-institutional population ages 18 years and older. Raw sample size is 145,007; weighted rescaled sample size is the same.

[a]Total chronic conditions reported in National Health Interview Survey Core. This is the best indicator of chronic illnesses for the person.

[b]Target disabling conditions: Main cause was asked for 17 specific disabilities (items on personal care, household management, physical limitations, sensory or communication limitations, cognitive or emotional limitations, physical or occupational therapy in past year). The dataset has 28,152 target disabling conditions (unweighted count).

[c]Total disabling conditions include the main-cause conditions plus (*a*) volunteered conditions (after main cause was queried, people sometimes mentioned others; viewed as secondary causes), (*b*) conditions that could not be clearly matched to a disability by NCHS during file preparation, and (*c*) main and secondary conditions for major activity limitation (which is queried in the NHIS Core) that are not picked up by the target disabilities. The dataset has 38,065 total disabling conditions (unweighted count).

[d]"Work" is paid job. "Not job-related" is retired, keeping house, in school (if age 30 years or older), and other nonspecific responses.

Table 3. Comparison of sociodemographic, health, and social participation characteristics of arthritis-disabled and other-disabled people, for community-dwelling adults, United States, 1994–95

Characteristics	*Arthritis and Rheumatic Conditions disability (N = 4638.2)* Mean or Percent	P[a]	*Arthritis disability (N = 3819.9)* Mean or Percent	P[b]	*Other disability (N = 22,903.5)* Mean or Percent	*Arthritis and Rheumatic Conditions disability versus Other disability* P[c]	*Arthritis disability versus Other disability* P[d]	*No disability (N = 117,465.3)* Mean or Percent
Sociodemographic								
Age (years; mean)	63.8	≤0.001	66.7	≤0.001	54.9	≤0.001	≤0.001	41.4
People 55 years or older (percent)	72.2	≤0.001	80.2	≤0.001	50.0			21.1
Female (percent)	72.9	≤0.001	72.7	≤0.001	52.7	≤0.001	≤0.001	51.3
Females 55 years or older (percent)	52.5	≤0.001	58.5	≤0.001	27.1	≤0.001	≤0.001	11.5
White non-Hispanic (percent)	80.7	≤0.001	80.6	≤0.001	79.5	>0.05	>0.05	74.8
Education (years; mean)	11.2	≤0.001	11.0	≤0.001	11.7	≤0.001	≤0.001	13.0
High school or more (percent)	62.0	≤0.001	58.5	≤0.001	68.0	—	—	84.4
Health								
Chronic conditions per person (mean)	2.78	≤0.001	2.85	≤0.001	2.25	≤0.001	≤0.001	0.58
People with one or more chronic conditions (percent)[e]	92.8	≤0.001	93.3	≤0.001	86.2	—	—	36.0
Target disabling conditions per person (mean)	1.44	≤0.001	1.45	≤0.001	1.29	≤0.001	≤0.001	0.00[f]
People with one or more target disabling conditions (percent)	100.0[f]		100.0[f]		100.0[f]	—	—	0.00[f]
Total disabling conditions per person (mean)	2.23	≤0.001	2.27	≤0.001	1.98	≤0.001	≤0.001	0.13[g]
People with one or more disabling conditions (percent)	100.0[f]	≤0.001	100.0[f]	≤0.001	100.0[f]	—	—	8.3[g]
Excellent/very good self-rated health (percent)	23.4	≤0.001	25.2	≤0.001	31.2	—	—	69.8
Fair/poor self-rated health (percent)	46.0	≤0.001	47.8	≤0.001	39.3	≤0.001	≤0.001	6.8
Social participation								
Major activity in past year is work (percent)	25.2	≤0.001	19.4	≤0.001	36.1	≤0.001	≤0.001	68.5
Major activity in past year is not job-related (percent)	73.1	≤0.001	78.8	≤0.001	60.9	≤0.001	≤0.001	24.5
Considered disabled by self or others (percent)	41.0	≤0.001	43.1	≤0.001	38.5	≤0.05	≤0.001	2.1

NOTES: Data are weighted to be representative of the civilian non-institutional population ages 18 years and older in each group. Raw sample sizes are 4779 with Arthritis and Rheumatic Conditions disability, 3944 with Arthritis disability, 23,373 with Other disability, 116,855 with No disability. Shown above are weighted sample sizes for each group. In cells where no data appear, pairwise tests were not conducted.

[a]Overall significance test of differences among three groups: Arthritis and Rheumatic Conditions disability, Other disability, No disability.

[b]Overall significance test of differences among three groups: Arthritis disability, Other disability, No disability.

[c]Pair-wise significance test of Arthritis and Rheumatic Conditions disability versus Other disability

[d]Pair-wise significance test of Arthritis disability versus Other disability

[e]Based on responses in NHIS Core. Not 100% for the disability groups because (*a*) additional conditions might be reported during the Disability Supplement, which follows the Core, and (*b*) a person can have disability without a specific underlying condition.

[f]Values are constrained by group definitions.

[g]People with "No disability" can have some non-target disabling conditions.

Table 3. (continued)

Characteristics	Arthritis and Rheumatic Conditions disability (N = 4638.2) Mean or Percent	P[a]	Arthritis disability (N = 3819.9) Mean or Percent	P[b]	Other disability (N = 22,903.5) Mean or Percent	Arthritis and Rheumatic Conditions disability versus Other disability P[c]	Arthritis disability versus Other disability P[d]	No disability (N = 117,465.3) Mean or Percent
Age-Sex Standardized Estimates[h]								
Sociodemographic								
Age (years; mean)	63.8		63.9		63.7	≤0.01	≤0.001	
Female (percent)	72.9[i]		72.9[i]		72.9[i]	—	—	
Females 55 years or older (percent)	52.5[i]		52.5[i]		52.5[i]	—	—	
White non-Hispanic (percent)	80.7		80.2		81.2	>0.05	>0.05	
Education (years; mean)	11.2		11.1		11.3	>0.05	≤0.01	
High school or more (percent)	62.0		60.5		63.5	>0.05	≤0.01	
Health								
Chronic conditions per person (mean)	2.78		2.84		2.46	≤0.001	≤0.001	
Target disabling conditions per person (mean)	1.44		1.44		1.30	≤0.001	≤0.001	
Total disabling conditions per person (mean)	2.23		2.26		2.10	≤0.001	≤0.001	
Fair/poor self-rated health (percent)	41.0		48.7		43.3	≤0.01	≤0.001	
Social participation								
Major activity in past year is work (percent)	25.2		23.0		24.1	>0.05	>0.05	
Major activity in past year is not job-related (percent)	73.1		75.3		73.8	>0.05	>0.05	
Considered disabled by self or others (percent)	41.0		43.4		38.8	≤0.05	≤0.001	

SOURCE: National Health Interview Survey Disability Supplement, Phase One, National Center for Health Statistics, pooled years 1994–95

[h]For standardized values, all groups are assumed to have the age-sex distribution of the Arthritis and Rheumatic Conditions disability group. Standardized values and their pair-wise significance tests are produced by SUDAAN. When a variable pertains to all people with Arthritis and Rheumatic Conditions disability (for example, age), the standardized value repeats the unstandardized value.

[i]By using the same age-sex distribution, these values are constrained to be equal across groups.

Arthritis and Rheumatic Conditions disability = people with one or more disabilities attributed to arthritis and other rheumatic conditions

Arthritis disability = people with one or more disabilities attributed to arthritis

Other disability = people with disabilities all caused by conditions *other than* arthritis and other rheumatic conditions

No disability = people without the target disabilities

for this analysis, telling us if arthritis-disabled people are different from other-disabled people. Most are highly significant ($P \leq 0.001$). All statements about differences (for example, "older than") refer to the pair-wise tests. Significance levels are $P \leq 0.001$ unless indicated otherwise, by the sign $^{\Phi}$. Please note that when we show three unlabelled numbers, they always refer to A&RDisab, ArthDisab, and OthDisab in that order; this will be clear by context.

Overall, arthritis-disabled people are older and more likely female than other-disabled people, they have substantially more health and disability problems, their work participation is lower, and they are more likely to self-identify as disabled (see Table 3).

Average age is 63.8 years for A&RDisab people and 66.7 for ArthDisab, compared to 54.9 for OthDisab. The arthritis disability groups are heavily female (73% A&RDisab, 73% ArthDisab) compared to other-disabled people (53%). Combining age and sex, we find that the majority of arthritis-disabled people are women ages 55 and older (52% A&RDisab, 58% ArthDisab), compared to only a quarter (27%) of other-disabled people. The arthritis disability groups have less education than other-disabled people (11.2 and 11.0 versus 11.7 years on average; 62% and 58% versus 68% with high school or more). There is little difference in race/ethnicity; percents of white non-Hispanic people are similar in the three groups (pair-wise $P > 0.05$).

All three groups have disability, but they differ sharply from each other in their health status. Arthritis-disabled people have more chronic conditions than other-disabled people (2.8 A&RDisab and 2.8 ArthDisab versus 2.2 OthDisab). The arthritis groups also have more disabling conditions (1.4 and 1.4 versus 1.3 target disabling conditions; 2.2 and 2.3 versus 2.0 total disabling conditions). The arthritis groups rate their health worse; 46-48% say their health is fair or poor compared to 39% of other-disabled people.

Arthritis-disabled people are less likely to say that work is their main activity in the past year than other-disabled people (25% and 19% versus 36%). In line with this, the percents with non-job-related roles are higher for the arthritis groups (73% and 79% versus 61%). All three groups have sizable disability identity, but the arthritis groups are higher (41%$^{\Phi}$ and 43% versus 38%).

Age-sex standardized results. Because the arthritis-disabled and other-disabled groups differ so greatly in age and sex distributions, we computed age-sex standardized values. Standardization makes groups equal in age-sex profile, letting us make comparisons that are free of those demographic factors. We chose the A&RDisab group's age-sex distribution for our standard, and computed adjusted values for the three groups (see Table 3).

Differences between arthritis-disabled and other-disabled people narrow, and their significance levels decline, but the central differences do remain. With age-sex controlled, arthritis-disabled people still have poorer health status than other-disabled people, and they view themselves as disabled more often. Major-activity differences disappear; the groups are actually very similar in main roles once age-sex distributions are controlled.

Disability characteristics of disabled people. Among all US adults with disability, physical limitations (PLIM) are most common, followed by household management (IADL) difficulties, and then personal care (ADL) difficulties (Table 4). The IADL disabilities are most severe and also have longest duration. ADL disabilities rank second for severity and first for all-at-once onset (2 or more disabilities), but they have shortest duration. PLIM disabilities have least severity, intermediate duration, and lowest chance of precipitous onset. Perfect hierarchy is most common for people with IADLs, less for ADLs, and least for PLIMs. Half of US adults with disability have sensory or communication problems, and one quarter have cognitive or emotional limitations. Major activity limitation and work limitation are quite common, affecting one quarter to one third of them.

Group comparisons. Overall, arthritis-disabled people have more ADL, IADL, and especially PLIM disabilities than other-disabled people, and they also have more work limitation (Table 5). But the arthritis groups are favored by less severity, shorter duration, and less precipitous onsets in each domain. Sensory or communication limitations, and cognitive or emotional ones, are less common for arthritis-disabled than other-disabled people.

- Personal care disabilities—The A&RDisab and ArthDisab groups have more ADL disabilities than the OthDisab group (0.41$^{\Phi}$, 0.45 versus 0.36 for average number, 17% and 19% versus 13% for people having one or more ADL) (Table 5). However, among people with ADL disabilities, the arthritis groups fare better with lower severity (1.69 and 1.70 versus 1.83), for shorter duration (6.6$^{\Phi}$ and 6.7$^{\Phi}$ versus 7.6 years for average duration, 7.3$^{\Phi}$ and 7.4$^{\Phi}$ versus 8.5 years for longest duration), and less all-at-once onset (82%$^{\Phi}$ and 82%$^{\Phi}$ versus 85% for people with any ADL[s];

Table 4. Disability and accommodation characteristics of community-dwelling adults with disability, US 1994–1995

	Mean	*Percent*
Disabilities		
Number of personal care disabilities (ADL) per person (mean)	0.37	
People with one or more ADLs (percent)		13.7
Among adults with ADL disability:		
Average severity of ADLs[a]	1.80	
Average duration of ADLs (years)[a]	7.42	
Duration of longest ADL (years)	8.22	
All-at-once onset of ADLs:[b]		
Including people with 1 ADL		84.6
For people with 2 or more ADLs		75.2
Perfect hierarchy of ADLs[c]		53.6
Number of household management disabilities (IADL):		
Per person (mean)	0.80	
People with one or more IADLs (percent)		37.9
Among adults with IADL disability:		
Average severity of IADLs[a]	2.42	
Average duration of IADLs (years)[a]	8.23	
Duration of longest IADL (years)	9.05	
All-at-once onset of IADLs:[b]		
Including people with 1 IADL		86.2
For people with 2 or more IADLs		68.9
Perfect hierarchy of IADLs[c]		77.0
Number of physical limitations (PLIM) per person (mean)	1.84	
People with one or more PLIMs (percent)		64.1
Among adults with PLIM limitation:		
Average severity of PLIMs[a]	1.60	
Average duration of PLIMs (years)[a]	7.61	
Duration of longest PLIM (years)	9.03	
All-at-once onset of PLIMs:[b]		
Including people with 1 PLIM		75.7
For people with 2 or more PLIMs		63.1
Perfect hierarchy of PLIMs[c]		27.1
Number of sensory or communication limitations (0–9; mean)	0.89	
People with one or more sensory or communication limitations (percent)		51.7
Among adults with sensory or communication limitation:		
Average severity of sensory or communication limitations[d]	1.25	
Number of cognitive or emotional limitations (0–7; mean)	0.65	
People with one or more cognitive emotional limitations (percent)		28.1
Activity limitation: people unable now to do major activity of past year[e]		24.6
Work limitation: people ages 18–69 unable to work		33.7

Table 4. (continued)

	Mean	Percent
Buffers		
Among adults with ADL disability:		
Number of ADLs with hands-on assistance[f]	1.64	
People with any hands-on assistance for ADLs		59.8
Number of ADLs with supervision assistance[f]	0.76	
People with any supervision assistance for ADLs		27.0
Number of ADLs with equipment assistance[f]	0.86	
People with any equipment assistance for ADLs		46.6
Index of assistance for ADLs[g]	3.26	
Number of different types of ADL assistance	1.33	
Any type of ADL assistance		86.1
One type of ADL assistance		49.3
Two or three types of ADL assistance		36.8
Among adults with IADL disability:		
Number of IADLs with personal assistance[h,i]	0.80	
People with any personal assistance for IADLs		85.4
Number of sensory equipment aids currently used (0–15)	0.13	
People currently using any sensory aids (percent)		9.4
Number of mobility equipment aids currently used (0–16)	0.31	
People currently using any mobility aids (percent)		21.6
Number of rehabilitation services used in past year (0–9 types; mean)	0.28	
People using any rehabilitation service in past year (percent)		22.2
Number of mental health services used in past year (0–2 types; mean)	0.17	
People using any mental health service in past year (percent)		13.8
Barriers		
Number of needed services (0–3 types; mean) [i]	0.01	
People who need any of the services (percent)		1.1

SOURCE: National Health Interview Survey Disability Supplement, Phase One, National Center for Health Statistics, pooled years 1994–95.

NOTES: "Adults with disability" have one or more of 17 target disabilities, relating to personal care (ADL) or household management (IADL) difficulty due to health, physical limitations (PLIM), sensory or communication limitations, cognitive or emotional limitations, and receipt of physical or occupational therapy in the past year. Data are weighted to be representative of the total civilian non-institutional population ages 18 years and older. Raw sample size of adults with disability is 28,152; weighted sample size is 27541.7.

[a]The severity and duration variables are each person's own mean values for his or her disabilities in the domain. Shown here are the means of those individual-level means. Severity categories are: Some = 1, A lot = 2, Unable = 3. The severity mean's range is 1–3. Duration is the number of years since first onset of the disability.
[b]All-at-once is scored when durations of a person's disabilities in a domain are the same.
[c]Perfect hierarchy exists when someone has a lower-prevalence disability and all higher-prevalence ones are present as well.
[d]Severity information exists for five of the sensory and communication items (see, hear, communicate, balance, smell). See footnote "a" for operational details.
[e]Categories are "working at a job or business," "keeping house," "going to school," or "something else."
[f]Hands-on assistance is "gets help from another person" when doing the task. Supervision is "needs to be reminded or needs someone close by" when doing the task. Equipment is "uses any special equipment" to do the task.
[g]Sum of the three assistance counts (hands-on, supervision, equipment). Range is 0–18.
[h]Personal assistance is hands-on or supervision.
[i]On waiting list for employment program; on waiting list for day activity center; needs a case manager.

Table 5. Comparison of disability and accommodations of arthritis-disabled and other-disabled people, for community-dwelling adults, US 1994–1995

Characteristics	*Arthritis and Rheumatic Conditions disability (N = 4638.2)* Mean or Percent	P[a]	*Arthritis disability (N = 3819.9)* Mean or Percent	P[b]	*Other disability (N = 22,903.5)* Mean or Percent	*Arthritis and Rheumatic Conditions disability versus Other disability* P[c]	*Arthritis disability versus Other disability* P[d]
Disabilities							
ADL (personal care)							
ADL disabilities per person (mean)	0.41	≤0.01	0.45	≤0.001	0.36	≤0.01	≤0.001
People with 1 or more ADL (percent)	17.2	≤0.001	18.9	≤0.001	13.0	—	—
Among adults with ADL disability:							
Average severity of ADLs (mean)[e]	1.69	≤0.001	1.70	≤0.001	1.83	≤0.001	≤0.001
Average duration of ADLs (years; mean)[e]	6.59	≤0.01	6.69	≤0.05	7.65	≤0.01	≤0.01
Duration of longest ADL (years; mean)	7.34	≤0.01	7.43	≤0.05	8.46	≤0.01	≤0.05
All-at-once onset of ADLs:[f]							
Including people with 1 ADL (percent)	81.8	≤0.001	81.8	≤0.001	85.3	≤0.05	≤0.05
For people with 2 or more ADLs (percent)	68.5	—	68.2	—	76.9	—	—
Perfect hierarchy (percent)[g]	44.6	≤0.001	45.3	≤0.001	56.1	≤0.001	≤0.001
IADL (household management)							
IADL disabilities per person (mean)	0.85	≤0.01	0.90	≤0.001	0.79	≤0.05	≤0.001
People with 1 or more IADL (percent)	44.8	≤0.001	47.4	≤0.001	36.5	—	—
Among adults with IADL disability:							
Average severity of IADLs (mean)[e]	2.36	≤0.001	2.39	≤0.05	2.44	≤0.001	≤0.05
Average duration of IADLs (years; mean)[e]	7.37	≤0.001	7.49	≤0.001	8.45	≤0.001	≤0.001
Duration of longest IADL (years; mean)	8.13	≤0.001	8.26	≤0.001	9.28	≤0.001	≤0.001
All-at-once onset of IADLs:[f]							
Including people with 1 IADL (percent)	83.3	≤0.001	82.8	≤0.001	86.9	≤0.001	≤0.001
For people with 2 or more IADLs (percent)	59.3	—	58.8	—	71.0	—	—
Perfect hierarchy (percent)[g]	81.8	≤0.001	82.6	≤0.001	75.8	≤0.001	≤0.001
PLIM (physical limitations)							
PLIMs per person (mean)	2.76	≤0.001	2.89	≤0.001	1.66	≤0.001	≤0.001
People with 1 or more PLIM (percent)	92.3	≤0.001	93.6	≤0.001	58.4	—	—
Among adults with PLIM limitation:							
Average severity of PLIMs (mean)[e]	1.54	≤0.001	1.56	≤0.001	1.62	≤0.001	≤0.001
Average duration of PLIMs (years; mean)[e]	7.38	≤0.05	7.61	≤0.05	7.69	≤0.05	≤0.05
Duration of longest PLIM (years; mean)	9.16	≤0.05	9.51	≤0.05	8.99	≤0.05	≤0.05

Table 5. (continued)

Characteristics	*Arthritis and Rheumatic Conditions disability (N = 4638.2)* Mean or Percent	P[a]	*Arthritis disability (N = 3819.9)* Mean or Percent	P[b]	*Other disability (N = 22,903.5)* Mean or Percent	*Arthritis and Rheumatic Conditions disability versus Other disability* P[c]	*Arthritis disability versus Other disability* P[d]
All-at-once onset of PLIMs:[f]							
Including people with 1 PLIM (percent)	68.2	≤0.001	66.2	≤0.001	78.1	≤0.001	≤0.001
For people with 2 or more PLIMs (percent)	53.4	—	52.3	—	66.4	—	—
Perfect hierarchy (percent)[g]	23.8	≤0.001	25.5	≤0.001	28.2	≤0.001	≤0.001
Sensory or communication limitations							
Number of limitations per person (mean)	0.73	≤0.001	0.76	≤0.001	0.92	≤0.001	≤0.001
People with 1 or more limitation (percent)	40.3	≤0.001	41.5	≤0.001	54.0	—	—
Among adults with sensory or communication limitations:							
Average severity of limitation(s) (mean)[h]	1.32	≤0.001	1.32	≤0.001	1.25	≤0.001	≤0.001
Cognitive or emotional limitations							
Number of limitations per person (mean)	0.53	≤0.001	0.52	≤0.001	0.67	≤0.001	≤0.001
People with 1 or more limitations (percent)	28.1	≤0.001	28.0	≤0.001	31.2	—	—
Activity limitation: people unable now to do major activity of past year (percent)[i]	21.9	≤0.001	22.3	≤0.001	25.1	≤0.001	≤0.001
Work limitation: people ages 18–69 unable to work (percent)	37.5	≤0.001	41.6	≤0.001	33.1	≤0.001	≤0.001
Buffers							
Among adults with ADL disability:							
Number of ADLs with hands-on assistance (mean)[j]	1.13	≤0.001	1.16	≤0.001	1.78	≤0.001	≤0.001
People with any hands-on assistance for ADLs (percent)	48.8	≤0.001	50.0	≤0.001	62.7	—	—
Number of ADLs with supervision assistance (mean)[j]	0.42	≤0.001	0.43	≤0.001	0.86	≤0.001	≤0.001
People with any supervision assistance for ADLs (percent)	16.0	≤0.001	16.6	≤0.001	30.0	—	—
Number of ADLs with equipment assistance (mean)[j]	0.83	≤0.05	0.85	≤0.05	0.87	≤0.05	≤0.05
People with any equipment assistance for ADLs (percent)	50.0	≤0.01	50.7	≤0.01	45.7	—	—

Table 5. (continued)

Characteristics	Arthritis and Rheumatic Conditions disability (N = 4638.2) Mean or Percent	P[a]	Arthritis disability (N = 3819.9) Mean or Percent	P[b]	Other disability (N = 22,903.5) Mean or Percent	Arthritis and Rheumatic Conditions disability versus Other disability P[c]	Arthritis disability versus Other disability P[d]
Index of assistance for ADLs (mean)[k]	2.38	≤0.001	2.43	≤0.001	3.50	≤0.001	≤0.001
Number of different types of ADL assistance (0–3; mean)	1.15	≤0.001	1.17	≤0.001	1.38	—	—
People with any type of ADL assistance (percent)	79.9	≤0.001	80.6	≤0.001	87.8	≤0.001	≤0.001
People with 1 type (percent)	52.4	—	51.7	—	48.6	—	—
People with 2–3 types (percent)	27.5	—	28.9	—	39.2	—	—
Among adults with IADL disability:							
Number of IADLs with personal assistance (mean)[l]	1.58	≤0.001	1.61	≤0.001	1.85	≤0.001	≤0.001
People with any personal assistance for IADLs (percent)	84.8	≤0.001	85.8	≤0.001	85.5	—	—
Number of sensory equipment aids used per person (1–15; mean)	0.10	≤0.001	0.11	≤0.01	0.13	≤0.001	≤0.05
People using any sensory aids (percent)	8.4	≤0.01	9.1	≤0.05	9.6	—	—
Number of mobility equipment aids used per person (0–16; mean)	0.45	≤0.001	0.48	≤0.001	0.28	≤0.001	≤0.001
People using any mobility aids (percent)	32.2	≤0.001	34.0	≤0.001	19.5	—	—
Number of rehabilitation services used in past year per person (0–9; mean)	0.25	≤0.001	0.21	≤0.001	0.29	≤0.001	≤0.001
People using any rehabilitation service (percent)	20.8	≤0.001	18.1	≤0.001	22.5	—	—
Number of mental health services used in past year per person (0–2; mean)	0.10	≤0.001	0.09	≤0.001	0.18	≤0.001	≤0.001
People using any mental health service (percent)	8.8	≤0.001	8.1	≤0.001	14.8	—	—
Barriers							
Number of needed services per person (0–3; mean)[m]	0.01	≤0.01	0.01	≤0.01	0.01	≤0.001	≤0.01
People who need any of the services (percent)	0.7	≤0.001	0.7	≤0.001	1.2	—	—

Table 5. (continued)

AGE-SEX STANDARDIZED ESTIMATES[a]

Characteristics	*Arthritis and Rheumatic Conditions disability (N = 4638.2)* Mean	Percent	*Arthritis disability (N = 3819.9)* Mean	Percent	*Other disability (N = 22,903.5)* Mean	Percent	*Arthritis and Rheumatic Conditions disability versus Other disability* P[c]	*Arthritis disability versus Other disability* P[d]
Disabilities								
ADL (personal care)								
Disabilities per person (mean)	0.41		0.44		0.43		>0.05	>0.05
Among adults with ADL disability:								
Average severity of ADLs (mean)	1.65		1.67		1.82		≤0.001	≤0.001
Average duration of ADLs (years; mean)	6.98		7.34		7.47		>0.05	>0.05
Duration of longest ADL (years; mean)	7.78		8.15		8.26		>0.05	>0.05
All-at-once onset of ADLs, including people with 1 ADL (percent)		81.9		81.7		85.0	>0.05	>0.05
Perfect hierarchy (percent)		42.6		42.4		54.9	≤0.001	≤0.001
IADL (household management)								
Disabilities per person (mean)	0.85		0.88		0.94		≤0.001	≤0.05
Among adults with IADL disability:								
Average severity of IADLs (mean)	2.34		2.36		2.45		≤0.001	≤0.001
Average duration of IADLs (years; mean)	7.34		7.74		8.06		≤0.05	>0.05
Duration of longest IADL (years; mean)	8.18		8.48		8.87		≤0.01	>0.05
All-at-once onset of IADLs, including people with 1 IADL (percent)		84.2		83.8		86.8	≤0.01	≤0.01
Perfect hierarchy (percent)		81.9		82.7		78.2	≤0.001	≤0.001
PLIM (physical limitations)								
Limitations per person (mean)	2.76		2.85		1.97		≤0.001	≤0.001
Among adults with PLIM limitation:								
Average severity of PLIMs (mean)	1.54		1.54		1.65		≤0.001	≤0.001
Average duration of PLIMs (years; mean)	7.37		7.65		7.75		≤0.05	>0.05
Duration of longest PLIM (years; mean)	9.14		9.47		9.25		>0.05	>0.05
All-at-once onset of PLIMs, including people with 1 PLIM (percent)		68.4		67.3		75.3	≤0.001	≤0.001
Perfect hierarchy (percent)		23.6		24.6		29.3	≤0.001	≤0.001
Number of *sensory or communication limitations* per person (mean)	0.73		0.73		0.96		≤0.001	≤0.001
Among adults with sensory or communication limitation:								
Average severity (mean)	1.32		1.32		1.27		≤0.001	≤0.01

Table 5. (continued)

Characteristics	*Arthritis and Rheumatic Conditions disability (N = 4638.2)* Mean	Percent	*Arthritis disability (N = 3819.9)* Mean	Percent	*Other disability (N = 22,903.5)* Mean	Percent	*Arthritis and Rheumatic Conditions disability versus Other disability* P[c]	*Arthritis disability versus Other disability* P[d]
Number of *cognitive or emotional limitations* per person (mean)	0.53		0.55		0.61		≤0.001	≤0.01
Activity limitation: people unable now to do major activity of past year (percent)		21.9		22.9		24.0	≤0.01	>0.05
Work limitation: people ages 18–69 unable to work (percent)		36.5		38.7		36.3	>0.05	>0.05
Buffers								
Among adults with ADL disability:								
Number of ADLs with hands-on assistance (mean)	1.13		1.19		1.75		≤0.001	≤0.001
Number of ADLs with supervision assistance (mean)	0.38		0.40		0.81		≤0.001	≤0.001
Number of ADLs with equipment assistance (mean)	0.80		0.80		0.86		>0.05	>0.05
Index of assistance for ADLs (mean)	2.32		2.40		3.42		≤0.001	≤0.001
People with any type of ADL assistance (percent)		79.0		80.3		87.8	≤0.001	≤0.001
Among adults with IADL disability:								
Number of IADLs with personal assistance (mean)	1.52		1.54		1.84		≤0.001	≤0.001
Number of sensory equipment aids used per person (mean)	0.10		0.10		0.15		≤0.001	≤0.001
Number of mobility equipment aids used per person (mean)	0.45		0.47		0.32		≤0.001	≤0.001
Number of rehabilitation services used in past year per person (mean)	0.25		0.23		0.25		>0.05	≤0.05
Number of mental health services used in past year per person (mean)	0.10		0.10		0.15		≤0.001	≤0.001
Barriers								
Number of needed services per person (mean)	0.01		0.01		0.01		≤0.05	>0.05

SOURCE: National Health Interview Survey Disability Supplement, Phase One, National Center for Health Statistics, pooled years 1994–95

NOTES: Data are weighted to be representative of the civilian non-institutional population ages 18 years and older in each group. Raw sample sizes are 4779 with Arthritis and Rheumatic Conditions disability, 3944 with Arthritis disability, 23,373 with Other disability. Shown above are weighted sample sizes for each group. In cells where no data appear, pairwise tests were not conducted.

[a]Overall significance test of differences among three groups: Arthritis and Rheumatic Conditions disability, Other disability, No disability

[b]Overall significance test of differences among three groups: Arthritis disability, Other disability, No disability.

[c]Pair-wise significance test of Arthritis and Rheumatic Conditions disability versus Other disability

[d]Pair-wise significance test of Arthritis disability versus Other disability

Table 5. (continued)

[e]The severity and duration variables are each person's own mean values for his or her disabilities in the domain. Shown here are means of those individual-level means. Severity categories are "Some" = 1, "A lot" = 2, "Unable" = 3. The range of severity mean is 1–3. Duration is years since first onset of the disability.
[f]"All-at-once" is scored when durations of a person's disabilities in a domain are the same.
[g]Perfect hierarchy exists when someone has a lower-prevalence disability and all higher-prevalence ones are present as well.
[h]Severity information exists for five of the sensory and communication items (see, hear, communicate, balance, smell). See footnote "e" for operational details.
[i]Categories are "working at a job or business," keeping house," going to school," or "something else."
[j]Hands-on is "gets help from another person" when doing the task. Supervision is "needs to be reminded or needs someone close by" when doing the task. Equipment is "uses any special equipment" to do the task.
[k]Sum of the three assistance counts (hands-on, supervision, equipment). Range is 0–18.
[l]"Personal" is hands-on or supervision.
[m]On waiting list for employment program; on waiting list for day activity center; needs a case manager
[n]For standardized values, all groups are assumed to have the age-sex distribution of the Arthritis and Rheumatic Conditions disability group. Standardized values and their pair-wise significance tests are produced by SUDAAN. When a variable pertains to all people with Arthritis and Rheumatic Conditions disability (for example, age), the standardized value repeats the unstandardized value.

Arthritis and Rheumatic Conditions disability = people with one or more disabilities attributed to arthritis and other rheumatic conditions
Arthritis disability = people with one or more disabilities attributed to arthritis
Other disability = people with disabilities all caused by conditions other than arthritis and other rheumatic conditions

68% and 68% versus 77% for people with two or more ADLs). Perfect hierarchy of ADLs is less typical for the arthritis groups than for other-disabled people (45% and 45% versus 56%).

- Household management disabilities—The arthritis groups have more IADL disabilities than other-disabled people (0.85[Φ] and 0.90 versus 0.79 for average number; 45% and 47% versus 36% for people having one or more IADLs). But, again, severity is less for the arthritis groups (2.36 and 2.39[Φ] versus 2.44), duration is shorter (7.4 and 7.5 versus 8.4 years for average duration; 8.1 and 8.3 versus 9.3 years for longest duration), and precipitous onsets are less common (83% and 83% versus 87% for people with any IADLs; 59% and 59% versus 71% for those with two or more IADLs). This time, arthritis-disabled people are more likely to have perfect hierarchy patterns of IADLs (83% and 83% versus 76%).

- Physical limitations—Arthritis-disabled people have notably more PLIMs (2.76 and 2.89 versus 1.66 for average number; 92% and 94% versus 58% for people having one or more PLIMs). But among people with PLIMs, the arthritis-disabled group has lower severity (1.54 and 1.56 versus 1.62) and less all-at-once onset (68% and 66% versus 78% for people with any PLIMs; 53% and 52% versus 66% for those with two or more PLIMs). Duration is comparable for the groups. Perfect PLIM hierarchy is less common for the arthritis-disabled groups (24% and 26% versus 28%).

- Other limitations—The A&RDisab and ArthDisab groups have fewer sensory or communication limitations, and fewer cognitive or emotional limitations, than OthDisab people. (For sensory or communication: 0.73 and 0.76 versus 0.92 for average number, and 40% and 42% versus 54% for people having one or more limitations; for cognitive or emotional: 0.53 and 0.52 versus 0.67 for average number, and 28% and 28% versus 31% for people having one or more limitations.) Though less common for the arthritis groups, the sensory or communication problems they do have are more severe (1.32 and 1.32 versus 1.25).

- Role limitations—Other-disabled people report greater trouble doing their major activity of the past year (22% A&Rdisab and 22% ArthDisab versus 25% OthDisab). However, focusing specifically on work ability, the arthritis-disabled groups are disadvantaged (37% and 42% versus 33% unable to work). ArthDisab people, especially, report inability to have a job.

Age-sex standardized results. Even after controlling for age-sex differences, virtually all the group differences remain (see Table 5). Sometimes their size and significance diminish, but just as often their size and significance stay intact.

Arthritis disability is preeminently a problem for older women.... People with arthritis disability endure extensive difficulties in their activities, but they manage to stay more independent than other-disabled people.

Differences in numbers of ADLs, IADLs, and PLIMs diminish, flipping for IADLs (so other-disabled people have more) and erasing for ADLs. PLIMs have a sturdy differential, with arthritis-disabled people still having notably more. The arthritis groups continue to be favored by less severity, shorter duration, and more gradual onsets in all three domains. Sensory or communication and cognitive or emotional limitations remain less common for arthritis-disabled people. The differences in social participation virtually disappear, meaning they were due to age-sex distributions and not to any special impacts of arthritis.

Accommodation characteristics of disabled people. Among US adults with ADL disability, most (86%) have some kind of assistance (see Table 4). The most common type is hands-on assistance from another person (60%), with equipment next (47%), and supervision least (27%). One-third of ADL-disabled people (37%) use multiple types of assistance. Among adults with IADL disability, the great majority (85%) have personal assistance for the tasks. For adults with any disability, there is low use of sensory equipment (9%) or mobility equipment (22%), and low use of special services for disability in the past year (22% rehabilitation service, 14% mental health service). Expressed needs for several services are very low (1%).

Group comparisons. Overall, arthritis-disabled people use notably fewer accommodations of all types compared with other-disabled people, with one important exception—mobility aids (see Table 5). The arthritis groups also report fewer service needs.

- Assistance for ADLs and IADLs—For ADLs, arthritis-disabled people have less hands-on assistance than other-disabled people (1.1 and 1.2 versus 1.8 ADLs with hands-on help; 49% and 50% versus 63% for people having any hands-on help). Similarly, the arthritis groups have less supervision assistance (0.4 and 0.4 versus 0.9 for average number; 16% and 17% versus 30% for people having any supervision). Arthritis-disabled people are more likely to use any equipment (50% and 51% versus 46%; the average number is comparable across groups). The overall profile of less assistance for the arthritis groups is reflected strongly in the index of assistance (2.4 and 2.4 versus 3.5), and also in the count of assistance types (1.2 and 1.2 versus 1.4 for average number; 80% and 81% versus 88% for people having any type of assistance). For IADLs, arthritis-disabled people also have less personal assistance (averages of 1.6 and 1.6 versus 1.8 IADLs with help; but equal percents of people with any help). These differences are striking, given that arthritis-disabled people have more personal care and household management limitations than other-disabled people.

- Specialized aids—Arthritis-disabled people use fewer sensory equipment aids (0.10 and 0.11 versus 0.13 for average number; 8% and 9% versus 10% for people using any). The situation changes sharply for mobility aids, where the arthritis groups have twice the level of use as other-disabled people (0.45 and 0.48 versus 0.28 for average number; 32% and 34% versus 20% for people using any).

- Services used and needed—The arthritis groups had fewer rehabilitation services in the past year than other-disabled people (0.2 and 0.2 versus 0.3 for average number; 21% and 18% versus 23% for people using any). They also used fewer mental health services (0.1 and 0.1 versus 0.2 for average number; 9% and 8% versus 15% for people using any). The arthritis groups also report less need for certain social services.

Age-sex standardized results. Differentials are essentially the same. They are usually as large and significant as before standardization (see Table 5). Buffers and barriers are still less common for arthritis-disabled people, except mobility aids.

DISCUSSION

In summary, arthritis disability is preeminently a problem for older women. Disabilities due to other conditions are less concentrated at older ages or among women. Arthritis-disabled people have poorer health than other-disabled people, and they are more likely to self-identify as having disability. Second, arthritis-disabled people have more ADL, IADL, and especially PLIM disabilities than other-disabled people. Despite this burden, their disabilities are less severe and also of shorter duration. Their disabilities are more likely to accumulate gradually, rather than occur all at once. Their combinations of disabilities are more diverse (less hierarchy) than for other-disabled people. Even when values are standardized, making ADL and IADL volumes similar across groups, the lesser burdens of severity, time, and suddenness for arthritis-disabled people stay strong and clear. Third, despite higher levels of ADL, IADL, and PLIM disability, arthritis-disabled people use fewer buffers of all kinds. The sole exception is mobility aids, where their use is twice that of other-disabled people. Arthritis-disabled people report fewer needs for disability services. Lastly, less work participation and greater work limitation reported for arthritis-disabled people is due to their older and more female age-sex distribution, not to special impacts of arthritis itself.

Our first two hypotheses are wholly supported. Arthritis disability is distinctive for its high volume combined with mild-to-moderate impact. Why are these conjoined? Arthritis often affects multiple body locations, and is frequently in both the upper and lower extremities. This "extensiveness" leads to disabilities in numerous activities, some depending on hand function, others on knee function, and so on. "Mildness" stems from typical features of arthritis symptoms: the symptoms often vary for a person in timing and intensity—pain is sometimes present, sometimes absent, sometimes intense, sometimes just irksome. The symptom repertoire is narrow, generally limited to pain, stiffness, and swelling. Symptoms are localized in joints and nearby bones, rather than far-ranging throughout the body. Finally, the discomforts of arthritis are less terrifying than for fatal diseases (for example, heart disease, diabetes, chronic obstructive pulmonary disease). People know their symptoms do not signal death. In sum, arthritis symptoms have on average less impact on activities than is typical for other prominent chronic conditions, especially lethal ones.

The third hypothesis is partly supported. We thought higher volume of disabilities would prompt the arthritis groups to use more accommodations of all sorts. Instead, they use fewer buffers than other-disabled people, except mobility aids. Those aids are designed for lower-extremity dysfunctions, a common outcome of arthritis and a key aspect of disabilities in daily activities. Arthritis-disabled people specialize in these aids. The empirical findings suggest they steer away from other kinds of buffers, or they create their own self-care approaches. In line with this, the arthritis groups state less need for certain social services than do other-disabled people.

We interpret these results to mean that although arthritis disability is extensive for individuals, affecting many of their activities, the impacts are usually mild-to-moderate. People manage without much personal assistance or special services. The sole area of high use (mobility aids) reflects the frequent location of arthritis in lower extremities, and also suggests preference for equipment-based aids. All in all, arthritis-disabled people have a distinctive disability profile compared to other-disabled people. The twin features of *extensiveness* and *mildness* occur not only in clinical features of arthropathies, but also play out in arthritis-related disabilities and accommodations.

Several aspects of the analysis deserve comment. First, group heterogeneity reduces differentials. Arthritis-disabled people have arthritis as a main cause of disability, but they may also have some other conditions as main causes. The other-disabled group is even more heterogeneous, containing people with all sorts of disabling conditions except arthritis. Heterogeneity on both sides reduces our chances of finding significant differences and of deriving compelling interpretations for those found. Yet, a consistent profile for arthritis-disabled people compared to other-disabled people emerges from the data, and the profile has clear interpretation based on arthritis' clinical and symptomatic features. It is a very strong signal of the distinctiveness of arthritis disability. Comparisons with less heterogeneity would likely show even more distinctiveness.

Second, the two arthritis groups yield similar results. The A&RDisab and ArthDisab groups have similar disability and accommodation levels. Researchers can choose to study the broad range of "arthritis and other rheumatic conditions" or the narrower range of "arthritis," confident that results from population-based data will be similar either way.

Third, age-sex differences do not explain the profiles. Because arthritis-disabled people are distinctly older and more female than other-disabled people, we computed age-sex standardized results. Remarkably, standardization rarely eliminates the initial differentials. Some diminish

in size and significance, while others stay as large and significant as before. Only a few differentials vanish (see Results). Thus, the original differences are a robust picture of disability and accommodations profiles, despite the sizable differences in age-sex composition of the arthritis and other disability groups.

CONCLUSIONS

Our goal is to describe the experience of arthritis disability for US adults, and to highlight its distinctiveness by comparing arthritis-disabled people with other-disabled people.

We study two arthritis disability groups, one with a broad span of arthritis and rheumatic conditions, the other focused on arthritis. They produce similar results. Thus, the term "arthritis-disabled people" readily applies to both here.

The disability burden of arthritis disability is broad and moderate. Arthritis-disabled people have more personal care (ADL) and household management (IADL) disabilities, and especially more physical limitations (PLIM), than other-disabled people. But this high volume is paired with lower severity, shorter duration, and less precipitous onsets. Arthritis disability prompts lower use of accommodations of many types, except mobility aids. This lower use probably is due to severity and preference: mildness offsets the impetus that high volume gives to finding buffers for disability. Also, arthritis-disabled people apparently prefer equipment aids or self-care, and are disinclined to use personal assistance and formal services, compared to other-disabled people. High use of mobility aids is related to the frequent presence of arthritis in knees and hips, plus the generally low costs and high availability of such aids. In short, people with arthritis disability endure extensive difficulties in their activities, but they manage to stay more independent than other-disabled people.

This analysis gives new grist to arthritis advocacy through its national, empirical, and comparative scope.[37] Advocates already cite the high prevalence of arthritis and arthritis disability in the adult population. Here, we show that the typical profile for individuals with arthritis disability involves numerous limitations. Advocates can speak of arthritis' wide impact on individuals' daily activities, and how such personal burdens expand to truly great disability impact for the total population. In addition, the mild-to-moderate nature of arthritis disability takes its own special toll, eroding the quality and ease of daily life in nagging, persistent ways. Rather than simply proclaim the specialness of arthritis disability, we have demonstrated it by comparing arthritis-disabled people with all other disabled people. This reveals unambiguously the distinctive features of arthritis disability for US adults in precise empirical terms.

What advocacy messages spring from this analysis? There are three to be drawn into policy and program discussions. Arthritis-disabled people should receive ample social services support for self-care activities. Expenditures for purchase and maintenance of special equipment should be facilitated by the federal government. And biomedical research on arthritis needs expansion so that, eventually, medical care is a strong companion to self-care for arthritis-disabled people.

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References

1. Callahan LF, Rao J, Boutaugh M. Arthritis and women's health: prevalence, impact and prevention. Am J Prev Med 1996;12:401-9.
2. Centers for Disease Control and Prevention. Arthritis prevalence and activity limitations, United States, 1990. MMWR Morb Mortal Wkly Rep 1994;43:433-8.
3. Centers for Disease Control and Prevention. Prevalence and impact of arthritis among women, United States, 1989–1991. MMWR Morb Mortal Wkly Rep 1995;44:329-34.
4. Collins JG. Prevalence of selected chronic conditions: United States, 1990-92. Vital and Health Statistics, Series 10, No. 194. Hyattsville (MD): National Center for Health Statistics; 1997. Pub. No.: DHHS-PHS 97-1522.
5. LaPlante MP. Data on disability from the National Health Interview Survey, 1983-85. Washington: Dept. of Education (US), National Institute on Disability and Rehabilitation Research; 1988.
6. Verbrugge LM. Pathways of health and death. In: Apple RD, editor. Women, health, and medicine in America. A historical handbook. New York: Garland;1990:41-79.
7. Verbrugge LM. Women, men, and osteoarthritis. Arthritis Care Res 1995;8:212-20.
8. Verbrugge LM. From sneezes to adieux: stages of health for American men and women. Soc Science Med 1986;22:1195-1212. (Expanded version in: Ward RA, Tobin SS, editors. Health in aging: sociological issues and policy directions. New York: Springer;1987:17-57.)
9. Centers for Disease Control and Prevention. Impact of arthritis and other rheumatic conditions on the health-care system, United States, 1997. Morb Mortal Wkly Rep 1999;48:349-53.
10. Felts W, Yelin E. The economic impact of the rheumatic diseases in the United States. J Rheumatol 1989;16:867-84.
11. Yelin E, Callahan LF. The economic cost and social and psychological

impact of musculoskeletal conditions. Arthritis Rheum 1995;38:1351-1362.
12. Yelin EH, Felts WR. A summary of the impact of musculoskeletal conditions in the United States. Arthritis Rheum 1990;33:750-5.
13. Nagi SZ. Some conceptual issues in disability and rehabilitation. In: Sussman MB, editor. Sociology and rehabilitation. Washington (DC): American Sociological Association; 1965. p. 100-13.
14. Pope AM, Tarlov AR, editors. Disability in America: toward a national agenda for prevention. Division of Health Promotion and Disease Prevention, Institute of Medicine. Washington: National Academy Press; 1991.
15. Verbrugge, LM. The iceberg of disability. In: Stahl SM, editor. The legacy of longevity: health and health care in later life. Newbury Park (CA): Sage; 1990. p. 55-75.
16. Verbrugge LM, Jette AM. The disablement process. Soc Science Med 1994;38:1-14.
17. Boult C, Kane RL, Louis TA, Boult L, McCaffrey D. Chronic conditions that lead to functional limitation in the elderly. J Gerontology: Med Sciences 1994;49:M28-M36.
18. Fried LP, Ettinger WH, Lind B, Newman AB, Gardin J. Physical disability in older adults: a physiological approach. J Clin Epidemiol 1994; 47:747-60.
19. Guccione AA, Felson DT, Anderson JJ, Anthony JM, Zhang Y, Wilson PWF, et al. The effects of specific medical conditions on the functional limitations of elders in the Framingham Study. Am J Public Health 1994; 84:351-8.
20. Jette AM, Branch LG. Impairment and disability in the aged. J Chronic Dis 1985;38:59-65.
21. Jette AM, Branch LG, Berlin J. Musculoskeletal impairments and physical disablement among the aged. J Gerontology: Med Sciences 1990; 43:M203-M208.
22. LaPlante MP. Medical conditions associated with disability. In: Thompson-Hoffman S, Storck IF, editors. Disability in the United States: a portrait from national data. New York: Springer; 1991. p. 34-72.
23. Lawrence RH, Jette AM. Disentangling the disablement process. J Gerontology: Soc Sciences 1996; 51B:S173-S182.
24. Picavet HSJ, van den Bos GAM. The contribution of six chronic conditions to the total burden of mobility disability in the Dutch population. Am J Public Health 1997;87:1680-2.
25. Pinsky JL, Jette AM, Branch LG, Kannel WB, Feinleib M. The Framingham Disability Study: relationship of various coronary heart disease manifestations to disability in older persons living in the community. Am J Public Health 1990;80:1363-8.
26. Verbrugge LM, Patrick DL. Seven chronic conditions: their impact on US adults' activity levels and use of medical services. Am J Public Health 1995;85:173-82.
27. Brandt EN Jr., Pope AM, editors. Enabling America. Assessing the role of rehabilitation science and engineering. Division of Health Sciences Policy, Institute of Medicine. Washington: National Academy Press; 1997.
28. Massey JT, Moore TF, Parsons VL, Tadros W. Design and estimation for the National Health Interview Survey, 1985–1994. Vital and Health Statistics, Series 2, No. 111. Hyattsville (MD): National Center for Health Statistics (US); 1989. Pub. No.: DHHS-PHS 89-1384.
29. Verbrugge LM. The Disability Supplement to the 1994–95 National Health Interview Survey (NHIS-Disability). Hyattsville (MD): National Center for Health Statistics (US), Div. of Health Interview Statistics; 1995.
30. Department of Health, Education, and Welfare (US). The International Classification of Diseases. 9th revision, clinical modification. Washington: Government Printing Office; 1980. Pub. No.: DHHS-PHS 80-1260.
31. National Center for Health Statistics. Medical coding manual and short index, National Health Interview Survey, 1995. Public use data file documentation, Part III. Hyattsville (MD): National Center for Health Statistics (US); 1997. Available from URL: **http://www.cdc.gov/nchs/data/med-code.pdf**
32. Edwards WS, Winn DM, Kurlantzick V, Sheridan S, Berk ML, Retchin S, et al. Evaluation of National Health Interview Survey diagnostic reporting. Vital and Health Statistics, Series 2, No. 120. Hyattsville (MD): National Center for Health Statistics (US); 1994. Pub. No.: DHHS-PHS 94-1394.
33. Lawrence RC, Helmick CG, Arnett FC, Deyo RA, Felson DT, Giannini EH, et al. Estimates of the prevalence of arthritis and selected musculoskeletal disorders in the United States. Arthritis Rheum 1998;41:778-99.
34. Shah, BV, Barnwell BG, Bieler GS. SUDAAN Software for the Statistical Analysis of Correlated Data [user's manual Vol. 1,2]. Release 7.5. Research Triangle Park (NC): Research Triangle Institute; 1997. Available from: URL: **http://www.rti.org/patents/sudaan**
35. Verbrugge LM, Yang L, Juarez L. Severity, timing, and structure of disability. (Under review).
36. Helmink CG, Lawrence RC, Pollard RA, Lloyd E, Heyse SP. Arthritis and other rheumatic conditions: who is affected now, who will be affected later? Arthritis Care Res 1995;8:203-11.
37. Arthritis Foundation, Association of State and Territorial Health Officials, Centers for Disease Control and Prevention (US). National Arthritis Action Plan: a public health strategy. Atlanta (GA): The Foundation; 1999. ■