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Volume Title: Health at Older Ages: The Causes and Consequences of Declining Disability among the Elderly

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Volume Publisher: University of Chicago Press

Volume ISBN: 0-226-13231-5

Volume URL: <http://www.nber.org/books/cutl08-1>

Conference Date: October 8-11, 2004

Publication Date: January 2009

Chapter Title: Introduction

Chapter Author: David M. Cutler, David A. Wise, Richard G. Woodbury

Chapter URL: <http://www.nber.org/chapters/c11108>

Chapter pages in book: (1 - 18)

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# Introduction

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An accumulating body of research has identified significant and ongoing improvements over time in the functional ability of older people, both in the United States and throughout the world. The implications of declining disability are enormous, and measurable in both social and economic terms. This volume is part of a continuing NBER project to understand the foundations of disability decline, what might be done to extend and even accelerate future improvements in functional ability, and how the benefits of disability decline can be evaluated and quantified in economic terms. Why is this so important?

*The quality of later life.* People are living longer than at any time in history. But will those increased years of life be characterized by functional disability or functional independence? Declining disability into the future will assure not just more years of life, but a better quality of later life.

*Population aging.* In addition to living longer as individuals, the baby boom generation is approaching retirement age. Thus the fastest-growing population groups in the future will be the oldest—those in their seventies, eighties, and nineties. Declining disability will moderate the economic and social challenges of a growing older population.

*Disability and work.* Disability is a major reason that people retire from the labor force. Disability declines will enable people to work longer, earn

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income longer, and contribute longer to the economic productivity of the labor market.

*Caregiving.* Informal caregiving within families, formal long-term care services, and residential care in nursing homes and other long-term care facilities together represent a major cost of disability. Declining disability will reduce all of the social, psychological, and economic costs associated with caregiving.

*Medical care.* The amount spent on medical care for individuals with disabilities is several times larger, on average, than the amount spent on medical care for those without disabilities. While many factors will play into future medical care costs in the United States, future disability rates are a significant factor. Medical advances and medical spending also have an important role in causing reductions in disability.

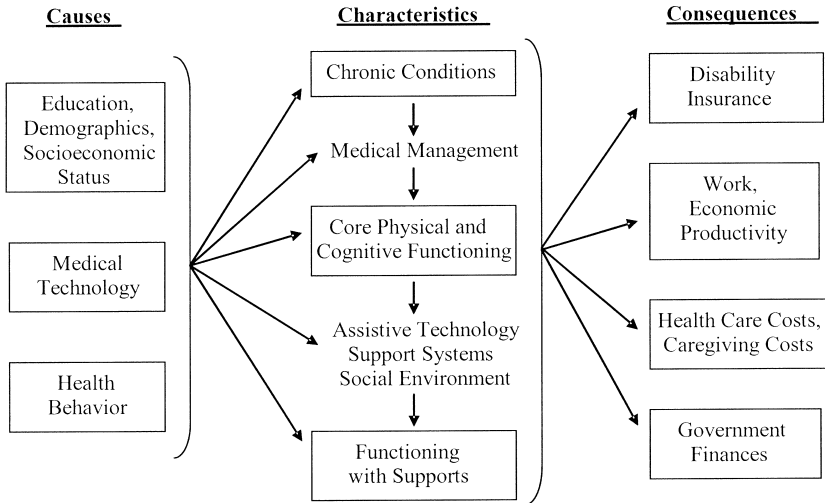
The value of functional health to individuals, caregivers, society, and the economy would be hard to overstate. By understanding the root causes of past disability decline, one can begin to look forward at likely future disability trends and factors that might stimulate further improvements in functional ability. One can also begin to quantify the value of disability decline, which encompasses all of these benefits: better quality of life, the ability to work and earn income longer, and the potential savings in caregiving and medical costs.

## **A Framework for Studying Disability**

To conceptually organize the complexity of issues involved in a comprehensive study of disability, we have structured our investigation in a way that considers together the causes, characteristics, and consequences of disability trends. The individual studies reported in this volume deal with smaller pieces of a larger and more integrated project effort. Figure 1 illustrates the structural framework around which we have organized this larger project effort, and some of the significant components that make up that larger effort.

The structural framework laid out in figure 1 categorizes factors that have contributed to disability decline (the causes), the multiple dimensions through which disability is measured or characterized (the characteristics), and some important implications of disability trends (the consequences). Each of the chapters in this volume fits into the overall framework, focusing in some way on a cause of disability or disability decline, an improved understanding of how health conditions relate to functional independence, or a consequence of disability decline. The framework is not so much a blueprint for the project, but rather a conceptual structure that relates individual investigations of disability issues in an integrated way.

The characterization of disability (the center section of fig. 1) is a partic-



**Fig. 1** A framework for studying disability

ularly important foundation for our inquiry, because it highlights the multiple dimensions through which one can analyze health and disability. One basis for analyzing disability is the presence of a chronic health condition. Thus, trends in the prevalence of chronic illnesses matter. However, the impact of chronic illness on core physical and cognitive functioning also changes over time, as we find ways to better manage the symptoms associated with chronic illness. So a second, more relevant measure of disability is core physical and cognitive functioning, independent of any chronic illness.

A third measure is our ability to live and function independently—to successfully accomplish the activities of daily living—despite our underlying physical and cognitive capacity, and using whatever assistive devices and social and environmental support systems that might be available. Trends in the technology, availability, and use of assistive devices are an important factor, as are broader changes in technology, such as remote control devices, microwave cooking technology, automation technologies, and mobile telephones. Social and community support systems also matter, such as transportation support, home delivery, Meals On Wheels (Association of America), and other services. The increasing options and variability in living arrangements, which combine housing and support services in innovative ways, also contribute to functional independence.

A fourth measure of disability focuses on the functional ability of individuals to work productively in the labor force. It highlights the critical interactions between functional ability, decisions about work and retirement, income, economic productivity, and the role of disability insurance.

Each of these measures of disability means something a little bit differ-

ent, and points to the complexity of what we mean by *disability*. Thus one direction of project research has sought to better characterize disability in its many dimensions, and how disability rates are changing over time.

After taking account of the multiple dimensionality of disability, we can then explore with better focus the causes of disability, the pathways through which individuals develop disabilities, the relationships between specific health conditions and disability, and the reasons behind disability trends. Among the factors contributing to disability trends are improvements in the diagnosis, prevention, and treatment of disabling illnesses; improved management of the disabling effects of chronic illness; improved treatment of mental illness; improvements in cognitive health; pharmaceutical innovations; healthier lifestyles and health-related behaviors; decreases in hazardous exposures and improved workplace safety; the emergence of a continuum of living arrangement options; improved and more widespread use of assistive devices and technologies that enable people with disabling conditions to function more effectively; improved and expanded environmental accommodations and social systems to support older and functionally disabled people; and societal changes that make physical and mental disabilities less of an impediment to independence.

The strong relationship between education and functional ability is also clear, suggesting an important role of education in preventing or deferring disability. In short, the factors contributing to disability decline are a complex combination of physiological, medical, economic, social, and environmental influences.

We can also explore with better focus the consequences of disability and disability trends for such issues as disability insurance, capacity for work and economic productivity, health care costs, caregiving costs, and government finances.

This volume reports on the early stages of a more comprehensive research agenda that investigates in some detail these relationships. In the remainder of this introduction, we summarize the fifteen chapters in the volume, drawing heavily on the authors' own descriptions of their work. The fifteen chapters cover a breadth of topics, drawing on various research methods, data sources, and definitions of disability and study populations. To organize this collection of research, we have divided the volume into five sections: (a) disability trends, (b) pathways to disability, (c) medical advances and disability, (d) work disability, and (e) assistive technology and caregiving.

## **Disability Trends**

The first section of the volume explores disability trends, focusing initially on long-term historical changes in health and functional ability. In chapter 1, "The Health of Older Men in the Past," Dora Costa details the

long-term improvements in health and longevity over the past century. This chapter is based on the health records of Union Army veterans, and considers three broad disease categories—heart conditions, musculoskeletal problems, and loss of cognitive functioning.

The results show that in the past, occupation was an important determinant of valvular heart disease, congestive heart failure, and joint and back problems, suggesting that higher socioeconomic status protected against mechanical wear and tear and that it purchased less crowding and therefore less infectious diseases such as rheumatic fever. The high probability of physical injury on the job and in the home, the high rates of infectious disease, and incomes that were too low to purchase uncrowded housing all explain why chronic disease rates were so high among men in the past. Declining disease rates and the shift from blue-collar to white-collar jobs explain a significant part of the decline in both valvular heart disease and arthritis. Additional potential explanations include the mechanization of blue-collar jobs and reductions in work injuries within jobs, innovations in medical care and the diffusion of accurate medical knowledge to individuals, and improvements in the food supply.

Declines in infectious disease rates resulted from many factors, including advances in medical technology, rising incomes and living standards, public health reforms, and improved personal hygiene. Public health reforms have included investments in sewage, clean water, clean milk supplies, and iron fortification. Cities also invested in disease reporting and quarantining systems and, in conjunction with private philanthropists, in well-baby and child health care (including vaccination) and in campaigns against specific diseases such as syphilis.

Chapter 2 also looks at the long-term historical foundations of disability decline, but with a focus on arthritis. In “Arthritis: Changes in Its Prevalence during the Nineteenth and Twentieth Centuries,” Paula Canavese and Robert Fogel compare the prevalence of arthritis among Union Army veterans with arthritis among men at the end of the twentieth century. The study finds that the current prevalence rate of arthritis is lower than it was in the late nineteenth century and the beginning of the twentieth century. The average age of onset of arthritis is eleven years later, and the proportion of men who ever get arthritis is substantially lower than it used to be.

One explanation suggested in the study is the progress of medicine during the last century, which has encompassed many new forms of treatment for arthritis. Also relevant are changes in public health, lifestyle, and the distribution of occupations. The tremendous change in public health infrastructure (e.g., improvements in the water supply, better sewage systems, cleaning of the milk supply) has reduced the probability of developing arthritis at later ages by reducing adverse health experiences during earlier years of life. Also, for those people who have it, arthritis is less severe now, partly because of many interventions that are used today, but that were not

available in the late nineteenth century. Medical advances have alleviated the severity of the condition, both through drugs and by advocating changes in lifestyle.

Chapters 1 and 2 provide a longer-term context for studying more recent disability trends. While the long-term historical foundations of disability decline may differ in detail from those that matter now, the major categories of influence are much the same. Medical advances, public health initiatives, improved health behaviors, improved economic conditions, and higher education attainment all were relevant then—and are still relevant today.

The focus of chapter 3 is on trends in health disparities over the past two decades. Health, disability, and mortality are highly correlated with socioeconomic and demographic factors. The question is whether health and functional ability are improving at different rates for different population groups, and thus whether the disparities in health status across groups are getting larger or smaller over time. In “Socioeconomic and Demographic Disparities in Trends in Old-Age Disability,” Robert Schoeni, Vicki Freedman, and Linda Martin document changes in disparities in old-age disability across socioeconomic and demographic groups, including education, income, race/ethnicity, age, gender, marital status, and region of residence. They find that old-age disability rates among all major socioeconomic and demographic groups declined over the past two decades, but the magnitude of the fall was larger for those who have higher income, have more years of education, are married, and are younger. For example, the decline in disability rates for those with a college degree was 2.5 percent annually, while the decline for those with less than eight years of education was 0.9 percent annually. The decline for those in the highest income quartile was 3.1 percent annually, compared with 1.4 percent in the lowest income quartile. The decline for married people was 4.0 percent annually, while the decline for singles was 1.4 percent annually. And the decline in disability at younger ages (seventy to seventy-four) was 2.8 percent annually, while the decline at older ages (eighty-five and older) was 1.1 percent. As a result of these differences in disability trends across population groups, disparities in disability rates have increased, rather than decreased.

The importance of education is highlighted in this study, as in others. Investigators suggest that education, among other things, may represent the lifelong effects of mediating factors, including early childhood experiences, access to medical care throughout the lifecourse, health behaviors, and ability to navigate the health care system and implement complex medical regimens. They suggest that to identify the causes of the declines in disability and shifts in the gaps in disability rates across demographic groups, we must look to these mediating effects as well as other factors not directly linked to educational attainment. Taken together, the factors causing a relationship between socioeconomic and demographic characteristics and disability are likely to be a complex mix of medical, social, and behavioral influences.

## Pathways to Disability

Another direction of our research, and the topic of chapters 4 and 5, focuses on the pathways through which individuals become disabled. A common framework for understanding pathways to disability is from an identifiable health condition that may develop over time to a physiological limitation to an inability to perform one or more activities of functional independence. By focusing on the pathway, one can also isolate points along it where interventions might make a difference. For example, one may effectively reduce disabilities anywhere along the pathway by preventing adverse health conditions and events before they develop, by early diagnosis, through medical treatment of the condition, by managing more effectively the symptoms of the condition, through the technological development and use of effective assistive devices, or through social and environmental supports that facilitate independent functioning despite a physiological limitation.

One is better positioned to identify the most efficient interventions if one knows the pathways through which disabilities develop. Thus, our research has tried to identify those pathways to disability that are most common, as well as the broader distribution of health pathways across healthy and less healthy circumstances. This can be done looking forward or backward in time. For example, what is the likelihood that a person in excellent health at age sixty will become disabled by age seventy, eighty, or ninety? How do these probabilities compare with someone who was in fair health at age sixty? Or what is the likelihood that someone with a particular health condition at age seventy-five was in poor, fair, good, or excellent health at age fifty-five?

This approach was the basis for research reported in chapter 4, “Pathways to Disability: Predicting Health Trajectories,” by Axel Börsch-Supan, Florian Heiss, Michael Hurd, and David Wise. Their basic finding is that differences in self-reported health at any age lead to dramatic differences in the likelihood of developing a subsequent disability. Health and disability at younger ages are strongly related to future health and disability paths as people age. This finding parallels the strong relationship between self-reported health and subsequent mortality. Reversing the analysis, they also find that survival to older ages (eighty or ninety) provides substantial information about health and disability status at younger ages.

Chapter 4 also highlights the very significant variation in pathways to disability across individuals with different education backgrounds, different incomes or wealth, or between those who are married and those who are single. At age fifty, for example, people with eight or fewer years of education are about four times more likely to be in poor health than people with sixteen or more years of education. The difference in rates of poor health between the low-education and high-education groups increases in parallel to about age seventy, when the two groups start to converge. There



is a similar pattern in the mortality rates of the two groups, but shifted to older ages. This, too, reflects the latter stages of the pathway from poor health to mortality. In continuing research, the investigators plan to consider other socioeconomic attributes, as well as the role of specific medical conditions.

The pathway to disability from specific medical conditions is already the focus of chapter 5, “Clinical Pathways to Disability,” by Mary Beth Landrum, Kate Stewart, and David Cutler. In this study, the investigators aim to disentangle the major clinical pathways through which the health of older people declines. Dementia is highlighted in the study as a leading precursor to disability. Other chronic and acute conditions that often lead to disability include cardiovascular disease (particularly heart failure and stroke), fractures, Parkinson’s disease, and arthritis. There is also a category of individuals who do not attribute their disability to any specific health condition, but instead cite symptoms or simply old age as the source of their disability.

In addition to identifying the major pathways, the study compares conditions that may be less common but have a major impact on disability (such as dementia) with conditions that are more common, but have a smaller impact on disability (such as arthritis). The study also differentiates between disability in mobility-related tasks, disability in complex tasks requiring cognitive capabilities, and disability in basic personal care tasks.

The investigators point to significant differences in costs, the nature and severity of disability, the types of functional limitations, and the types of help and assistive services that are used, depending on the clinical pathway that leads to disability. For example, while respondents with dementia had relatively low rates of hospitalizations and physician visits, almost half were institutionalized. The heavy reliance on personal assistance with Activities of Daily Living (ADL) and Instrumental Activities of Daily Living (IADL) tasks among disabled respondents with dementia also suggests potential caregiver burden among this cohort. In contrast, newly disabled respondents with arthritis were relatively infrequent users of intensive inpatient or nursing home care, but had higher than average use of medications and physician visits. In addition, arthritis was most strongly associated with the use of assistive equipment alone. Those attributing their disability to symptom causes or old age tended to have less severe disability, use fewer supportive services, and use less health care more generally.

Both chapters 4 and 5 help to understand the process through which individual health evolves, enabling more careful targeting of interventions toward individual pathways that lead to disability. The direct relationships between specific clinical conditions, and the development of particular functional disabilities—with particular needs for management, treatment, and assistive care—should facilitate more effective targeting of both medical and nonmedical interventions.

## Medical Advances and Disability

The third section of the volume is a natural extension of the first two. Medical advances are an important factor in explaining the improvements in health and longevity that have occurred over time, as emphasized in the research on disability trends. Medical advances are also a means to delay or prevent the development of a functional limitation among individuals, as emphasized in the research on pathways to disability. In this section, therefore, we look at some of the effects of medical advances on specific health conditions and in turn, the effect of improving health on medical care spending.

Chapters 6 and 7 are condition-specific studies. Specific medical advances (such as cataract surgery, antidepressant medication, beta blockers, or hip replacements) have been most important in treating or preventing the functional limitations associated with specific health conditions. Thus, understanding the relationships between specific medical advances, individual health conditions, and functional limitations (and how these relationships have evolved over time), is critical to understanding the deeper causes of disability decline.

Cardiovascular disease is a natural candidate for condition-specific analysis because it is the most common cause of death in the United States, because treatment technology has evolved considerably, and because more is spent on cardiovascular disease than on any other condition. Therefore, it is a condition where medical care could really matter. In chapter 6, “Intensive Medical Care and Cardiovascular Disease Disability Reductions,” David Cutler, Mary Beth Landrum, and Kate Stewart look at the particular role of improvements in cardiovascular disease treatment in the overall composition of disability decline in the United States.

Their analysis has three parts. In the first part, they examine basic trends in disability associated with cardiovascular disease. They show that reduced disability for people with cardiovascular disease incidents is a major part of the reduction in overall disability in the United States, accounting for between one-fifth and one-third of the total reduction in disability. The second part of the chapter considers the role of advances in medical care in reducing disability from cardiovascular disease. In this part of the analysis, Cutler, Landrum, and Stewart estimate that the use of improved treatments for heart attacks, including prescriptions of beta-blockers, aspirin, and ace-inhibitors at discharge—as well as use of reperfusion and other surgical procedures—increased the probability that elderly patients survive an acute cardiovascular event in a nondisabled state by 14 to 22 percent between 1984 and 1994. As one might expect, patients living in regions with high use of appropriate medical therapies had better health outcomes than patients living in low-use areas.

The third part of chapter 6 attempts to quantify the long-term health

and financial impacts of improved care for people with cardiovascular disease. The study estimates that preventing disability after an acute event can add as much as 3.7 years of quality-adjusted life expectancy, or perhaps \$316,000 of value. The cost of this change is much smaller. The initial treatment costs range from \$8,610 to \$16,332, depending on procedure use. Further, recent cost analyses reported that annual Medicare spending was lower for the nondisabled compared to the disabled, which suggests that higher treatment costs may be offset by lower future spending among a more healthy population. Therefore, by virtually any measure, improved medical technology after acute cardiovascular episodes is worth the cost.

An important question is whether these conclusions extend to other conditions beyond cardiovascular disease. Chapter 7 focuses on arthritis and mobility-related disabilities. In “Are Baby Boomers Aging Better than Their Predecessors? Trends in Overweight, Arthritis, and Mobility Difficulty,” Suzanne Leveille, Christina Wee, and Lisa Iezzoni look in an integrated way at trends in arthritis prevalence, being overweight, and having a mobility-related disability. As with most other functional limitations, mobility-related disability appears to be declining over time. The significant advances in medical treatment for arthritis and other mobility-impairing conditions, including both pharmacological and surgical advances, are no doubt related to the decreasing prevalence of mobility-related disabilities and can be compared qualitatively with the impact of medical advances on disability from cardiovascular conditions, as explored in the previous chapter. Countering these positive trends, however, are the significant increases in the population of Americans who are overweight or obese—conditions that are associated with increased mobility difficulty. Chapter 7 is an exploratory compilation of these interrelated issues and trends.

The study quantifies the prevalence of overweight, arthritis, and mobility disability across successive waves of the National Health and Nutrition Examination Surveys (NHANES), comparing women and men born in ten-year intervals: 1926–1935, 1936–1945, 1946–1955, and 1956–1965. The proportion of Americans who are overweight was found to increase substantially. When the two older cohorts were aged thirty-five to forty-four years, 38–42 percent of women were overweight (Body Mass Index [BMI] >25). When the two younger cohorts were aged thirty-five to forty-four, 50–60 percent of women were overweight. Despite this increase, the prevalence of mobility difficulty (measured in the two most recent waves of the NHANES) declined in each successive birth cohort. That suggests that other factors, such as medical advances and changes in the distribution of occupations in the workforce, have offset the potentially detrimental effects of being overweight. How these trends will evolve and interact going forward, however, is a question for continuing research.

A common thread in chapters 6 and 7 is the important role of medical advances as a major influence on disability trends, whether focused on car-

diovascular disease, arthritis, or other conditions. Medical advances are likely an important factor in reducing almost any form of disability, and almost any health condition associated with disability. How all of this relates to health care costs is a question raised in chapter 8. Of course, developing and using new medical technologies and treatments costs money. On the other hand, those who are healthier and less functionally disabled spend less on medical care than those who are not. How these offsetting influences affect health care costs on balance is an open question.

In chapter 8, “Disability and Spending Growth,” Michael Chernew, Dana Goldman, Feng Pan, and Baoping Shang analyze spending trends by those with and without functional limitations. The primary finding is that the rate of growth in medical spending is faster for those who are not disabled than it is for those who have functional disabilities. The argument is made, therefore, that there is some convergence in health care spending across disability categories and, if such a convergence continues, savings accruing to improved disability status may have less of an impact on overall spending than analysis of current spending patterns would suggest.

A fundamental question raised in the chapter is whether this convergence will continue. Related questions are whether the increases in spending among those who spend very little are economically significant relative to the spending of those who spend a lot, how medical and pharmacological advances relate to costs, and the influence of disability trends on the lifetime medical expenditures of individuals. These are topics for continuing research.

## Work Disability

The next section of this volume focuses on work-related disability. In addition to the personal burden of disability and the expense of medical and assistive care, an important economic consequence of disability results from lost earnings. In this section, we look at the measurement of work disability, the extent of disability risk, and the growing number of recipients of disability insurance benefits.

The section begins with a methodological study on the measurement of work disability. Self-reported disability is influenced by many factors, including how people interpret survey questions, based on the phrasing of the question, the frame of reference of the respondent, or on cultural or social norms. These factors may have nothing to do with underlying health. For example, Americans are four times more likely to state that they are in excellent health than the Dutch—a discrepancy that could not possibly result from differences in actual health status between the two populations.

In chapter 9, “Work Disability is a Pain in the \*\*\*\*\*, Especially in England, the Netherlands, and the United States,” James Banks, Arie Kapteyn, James Smith, and Arthur van Soest investigate the wide variation across

these countries in self-reported work disability. The diversity in reported work disability stands in sharp contrast to the relative similarity across these countries in standards of living and in more objective health measures. The authors investigate in particular the role of pain as a factor leading to work disability in the Netherlands, the United Kingdom, and the United States.

They find that pain is by far the most important factor leading to reports of work disability in all three countries. However, respondents who appear to be suffering from similar degrees of pain respond very differently to questions on work disability, depending on which country they are from. These differences in the relationship between pain and work disability do not appear to be related to differential use of painkillers or differential degrees of work accommodation across countries. The authors suggest instead that the differences in self-reported work disability result primarily from differences in thresholds, or response scales that relate to work disability. Similar differences in response scales were found within countries, based on gender, education, and age.

Based on a new research methodology known as *vignettes*, in which respondents are asked to evaluate the health of a hypothetical person described in the survey, the findings from chapter 9 suggest that a significant part of the observed difference in reported work disability between the two countries is explained by the fact that residents use different response scales in answering the standard questions on whether they have a work disability. Essentially for the same level of actual work disability, Dutch respondents have a lower response threshold in claiming a work disability. The vignette methodology helps to calibrate differences in self-reports across cultural, socioeconomic, or cross-national groups.

Chapter 10 focuses on the economic risk associated with a work disability. The onset of disability has significant economic as well as lifestyle consequences. Disability generally leads to greater medical and caregiving expenses, and in some cases, dramatically higher expenses. At the same time, it can require a departure from the labor force and a loss of earnings. The combination of lost earnings and increased expenses can impose a very significant financial burden, not only on individuals who become disabled, but their families as well. The limited probability of a very high cost occurrence makes disability risk a natural circumstance for insurance. In chapter 10, "Disability Risk and the Value of Disability Insurance," Amitabh Chandra and Andrew Samwick consider the magnitude of the disability risk, the extent of precautionary saving for potential disability, and the value of disability insurance.

Part of their work analyzes the decline in disability in the working age population over the past two decades (i.e., focusing on people under age sixty-five). In the early 1980s, disability rates of working-age men were about two percentage points higher than those of women. But over the pe-

riod from 1980 to 2003, they find a substantial decline in work-limiting disability among men (but not for women), so that men and women now have similar disability rates at the end of their working lives. For men, the declines in disability are particularly significant among those age fifty-five to sixty-four, rather than at younger ages. As in other studies, Chandra and Samwick find that the largest disparities in disability rates are found across educational groups: by age sixty-two, about 17 percent of those without a college education have a work-limiting disability, compared to about 5 percent of those with a college education.

Based on this risk analysis, Chandra and Samwick then consider the relative value of precautionary saving and insurance against the risk of disability. They estimate that no more than 20 percent of preretirement savings is precautionary saving against the risk of disability for any demographic group. (The average precautionary saving for disability risk among all demographic groups is closer to 4 percent of saving.) Compared to other motives for saving, like saving for retirement, or saving for routine income fluctuations over a working career, disability risk generates comparatively little additional saving. The investigators suggest that because the probability of work disability is small and the average size of the loss—conditional on becoming disabled—is large, disability risk is not effectively insured through precautionary saving.

They find that disability risk is addressed much more effectively through disability insurance. They estimate that a typical consumer would be willing to pay about 5 percent of his or her lifetime consumption toward disability insurance. About 2 percentage points reflect the impact of disability on expected lifetime earnings; the remaining 3 percentage points are attributable to the uncertainty associated with the disability risk. Thus, the value of disability insurance is likely to be very high.

Chapters 11 and 12 look at the dramatic growth in recent years in the number of people receiving disability insurance benefits, despite the apparent declines in disability rates. During the last two decades, the fraction of nonelderly adults receiving Social Security Disability Insurance (SSDI) benefits increased by 76 percent. In chapter 11, “Why Are the Disability Rolls Skyrocketing? The Contribution of Population Characteristics, Economic Conditions, and Program Generosity,” Mark Duggan and Scott Imberman consider three categories of explanation: the characteristics of individuals insured by the DI program, the state of the economy, and the generosity of program benefits.

One explanation for the increasing number of DI recipients is the changing age structure in the U.S. population, highlighted by the aging of the baby boom generation into a period of life when one might expect a large increase in DI receipt. Duggan and Imberman find that age demographics explain about 15 percent of the increase in DI receipt among men and about 4 percent for women. The increasing coverage of women under the

disability program (resulting from the increased labor force participation of women) explains another 24 percent of the growth in DI receipt among women. A second explanation is that adverse economic shocks affected applications. Confirming this explanation, the study finds that the recessions of 1991 and 2001 can explain 24 percent of the growth in DI receipt among men and 12 percent of the growth among women.

A third explanation is DI benefit generosity. Because of the interactions between rising income inequality and the progressive benefit formula used by the Social Security Administration (SSA), low-skilled individuals can now replace a much larger fraction of their earnings with DI benefits than they could have two decades ago. The findings suggest that rising replacement rates can explain 28 percent of the growth in DI receipt among women and 24 percent of the growth for men. A fourth explanation is the more liberal definition of disability used to determine DI eligibility. These changes differentially increased the probability that individuals with mental disorders or musculoskeletal conditions (e.g., back pain, arthritis) were awarded DI benefits, with the fraction of DI awards to these two conditions increasing from 28 percent in 1983 to 52 percent twenty years later. The findings suggest that the liberalized eligibility criteria can explain 38 percent of the growth in DI receipt among women and 53 percent for men. Duggan and Imberman conclude the chapter with a forecast of the changes in disability reciprocity that will occur during the upcoming years, arguing that the growth in DI rolls is likely to continue and perhaps accelerate going forward.

Chapter 12 looks at the particular impact of depression on disability enrollment. Since the early 1990s, mental illnesses are the fastest-growing cause of new claims for income support from the DI and the SSI programs, making up 30 percent of DI awards in 2000. In chapter 12, “Early Retirement and DI/SSI Applications: Exploring the Impact of Depression,” Rena Conti, Ernst Berndt, and Richard Frank look at the potential effects of one major mental health condition, depression, and its dual effect on work-related activity. Depression may have both a direct effect on work, reducing an individual’s interest and productivity in the workplace, and an indirect effect, through its interaction with physical illnesses and other life events. To examine the direct impact, the study focuses on individuals who experience an incident case of depression and compares these people to similar individuals who did not experience a new episode of depression. To estimate the indirect effects, the study compares the work activity responses to adverse health events (and other life events, such as widowhood) for people likely to have depression and a similar group of people without significant symptoms of depression.

The results of both estimation strategies indicate that depression decreases work, increases early retirement, and increases DI/SSI applications. Depression alone induces some DI applications. Depression also works in combination with other medical illnesses and widowhood to increase DI

applications. The magnitude of the effects appears to be of the same order of magnitude to that of physical illness. These findings have important implications for interpreting disability levels and trends, partly because of the direct effect of depression on disability, and partly through the significant indirect interactions between depression and physical illness. Similar to cardiovascular disease, there have been significant advances in the treatment of depression over the past two decades. A final aspect of chapter 12 is to estimate roughly the returns to depression treatment, assuming treatment returns an individual to the likelihood of employment status enjoyed by a nondepressed individual. The receipt of guideline treatment for depression in the study population is estimated to result in a three to fifteen percent point reduction in adverse employment outcomes. Thus, the impact of treatment for depression on work disability may be substantial, and represents an important area for continuing study.

### **Assistive Technology and Caregiving**

The last section of this volume looks at how people function with physiological limitations. One way is through the use of assistive devices. Advances in assistive technology and increasing use of assistive devices and equipment are an important component of increasing functional independence in the population. Another way is through paid medical and caregiving services, or through unpaid caregiving within families. Chapters 13 through 15 deal with three diverse questions under this broader theme: trends in the use of assistive technologies, how those with functional limitations feel about their health care, and how the burden of caregiving affects spouses.

In chapter 13, “Trends in Assistance with Daily Activities: Racial/Ethnic and Socioeconomic Disparities Persist in the U.S. Older Population,” Vicki Freedman, Linda Martin, Jennifer Cornman, Emily Agree, and Robert Schoeni explore older U.S. population trends in forms of assistance with daily activities and disparities in assistance by race/ethnicity and socioeconomic status. A core finding from the study is a substantial increase between 1992 and 2001 in the independent use of assistive technology (without help from another person). In general, similar trends are found across demographic groups. Still, some socioeconomic groups are more likely to use assistive technology without help than others. Notably, higher levels of education are associated with higher probabilities of using technology independently to carry out daily activities. Among those with difficulty with one or more daily activities, all else equal, there has been a persistent five percent point gap in the independent use of assistive technology between those with more than a high school education and those with eight or fewer years of completed education. Even larger gaps by education are evident among those reporting difficulty bathing—reaching eight percent in 2001.

The investigators report a number of limitations in their analysis. First,



questions about assistive devices were limited to those individuals reporting that they experienced difficulty with a particular task, omitting those individuals who benefit from an assistive technology but who do not report a difficulty. Second, the study only analyzed technologies that are specifically designed for day-to-day tasks, excluding related advances that have also improved quality of life and independence. Third, the analysis considers only personal care activities, setting aside for future research the role of technology in reducing IADL limitations. Each of these limits suggests an even larger impact of assistive technologies on the quality of life and the functional independence of individuals as they age. The scope of applications for assistive technologies, the development of new technologies, and the dissemination and increased use of assistive technologies contribute significantly to disability trends.

In chapter 14, “How Do Medicare Beneficiaries with Physical and Sensory Disabilities Feel about Their Health Care?,” Lisa Iezzoni, Jane Soukup, and Suzanne Leveille consider how people with specific sensory and physical impairments perceive various aspects of their health care. The Medicare Current Beneficiary Survey (MCBS) asks respondents twenty questions about their health care experiences that fit generally into three broad dimensions: access to care, (including costs of care), technical quality of care, and interpersonal quality of care.

The study finds that the vast majority of Medicare beneficiaries with or without disabilities perceive their physicians as competent and well trained and hold favorable views of their overall quality of care. Along most other dimensions of care, 80 to 90 percent of persons report satisfaction, regardless of disability. However, after accounting for various demographic and other respondent attributes, Medicare beneficiaries with major sensory and physical disabilities are significantly more likely to be dissatisfied with the care they receive. Their concerns include difficulties accessing care, perceived incomplete understanding by physicians of patients’ clinical histories and conditions, lack of thoroughness, and inadequate communication. These findings held across disabling conditions. People with disabilities are much more likely than others to lack confidence in their doctors.

The study suggests some of the reasons for dissatisfaction, as well as approaches to care that might improve satisfaction, including facilitating transportation, communication, and time spent with a physician. Four factors may lead patients with disabilities to need more time with their physicians than patients without disabilities: complex underlying medical conditions, extra knowledge, skill, sensitivity, or time required by clinicians because of the disabling condition itself; the need to employ special means to ensure effective communication, such as sign language interpreters or assistive listening devices; and discordant perceptions and expectations between physicians and patients, especially around the experience of disability. Other suggestions to improve patient satisfaction include environ-

mental accommodations (e.g., ramps, widened doorways, automatically adjustable examination tables), specialized resources (e.g., large print and Braille written materials, readily available sign language interpreters), and flexible practice policies (e.g., longer appointment times).

Completing the volume, chapter 15 analyzes the possibility that improvements in functional ability may have multiplier effects beyond their impact on those who might otherwise become disabled. In chapter 15, “Interspousal Mortality Effects: Caregiver Burden Across the Spectrum of Disabling Disease,” Nicholas Christakis and Paul Allison explore the possible externalities of health and disability on caregivers and others who may be affected by those who are ill or functionally impaired. They hypothesize that the process of caregiving for a loved one, the process of sharing in the illness of a loved one, and even the process of dying have spillover effects from one person to another. The spillover effects might result from the stress imposed by a partner’s illness, or the loss of social support that is provided by the partner. The implication of the theory is that improvements to health and functional ability have a multiplier benefit well beyond the individuals affected directly.

To test the theory, Christakis and Allison look at the effect of serious illness on the health and mortality of spouses. They find that certain serious illnesses (stroke, the onset of dementia, and psychiatric disease) can have a significantly detrimental effect on the spouses of those who become ill or functionally impaired. The health impact of being in a caregiving role varied according to the duration of the role, with periods of greatest impact occurring within a few months of spousal hospitalization and a year or more afterward. Christakis and Allison conclude that it may be almost as bad for someone’s health to have his or her partner fall ill, especially with certain diseases, as it is for that partner to die. Cancer is less burdensome to caregiving spouses than other conditions, such as dementia.

The results reported in chapter 15 support the idea of an externality, or multiplier impact of illness and disability beyond the individual affected directly, extending to those who care for them. This means that efforts to reduce disease, disability, and death can be self-reinforcing, that medical care has a social value larger than the value to the individual patient, and that the cost-effectiveness of medical interventions should account for both the direct impact on patients and the indirect impact on those who care for them.

## **Future Research**

While there is no shortage of important topics for continuing research, we highlight several themes from the research reported in this volume. One of those themes is the important influence of education on disability trends. Across many of the investigations reported in this volume, education is consistently identified as a significant contributing factor to disabil-

ity trends. Future work should be done to figure out why education is so important to the likelihood of becoming disabled, and what the strong relationship suggests for future disability trends.

The second theme is to disentangle the complex interrelationship between medical costs and disability trends, an issue that is complicated by the complexity of the causal relationships between them. On the one hand, medical spending is an important causal factor in improving functional health, as advances in medicine and the provision of medical care services prevents, delays, or alleviates the symptoms of potentially disabling medical conditions. Throughout this volume are examples of what medical advances have done to reduce disabilities. Thus, it is clear from our research that medical spending has a role in buying declining disability. On the other hand, those who are less disabled require less medical care, at least in the short term, than those who are more disabled. From the reverse perspective, therefore, better functional health may lead to reduced medical spending in the population as a consequence of disability decline. Both factors are almost certainly part of the relationship, and disentangling them is an important objective of our continuing research effort.

A third theme is to consider more comprehensively the relationship between disability trends and work. Many of the economic costs of disability result from the loss of productive capacity, the loss of income, and the reduced labor force participation of those who develop functional limitations. To what extent might we expect declining disability, in conjunction with modifications to retirement policies, to change work and retirement behavior at older ages? To what extent can the ability to work longer moderate the economic and financial pressures of an aging population?

The fourth and related theme of continuing research is the effect of disability on government finances. For example, what will be the financial impact on Social Security, Disability Insurance, and other income-support programs of enabling people to stay in the workforce longer? Will there be financial benefits to Medicare, Medicaid, and other health programs as a result of lower medical costs and lower caregiving costs from a healthier older population? How will the broader economic and tax implications of a healthier population affect government finances more generally?

The important relationships between education and disability, medical advances and disability, work, population aging, government finances, and the economy are core topics of continuing research interest.