

Trends in the Prevalence of Work Disability from 1962 to 1984, and Their Correlates

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THROUGH MUCH OF THE POSTWAR PERIOD, THE United States has experienced a puzzling pattern of trends in indicators of health status. At the same time that age-specific mortality rates have fallen, suggesting improving health and longevity, researchers have found an increase in self-reports of disability among the working-age population and deterioration in a variety of other indicators of health status. Several speculations have been offered for these disparate trends.

First, because the retirement of healthy and able-bodied workers prior to the age of 65 has been viewed by some as inappropriate, those early retirees desiring to avoid these stigma costs may cite health problems as the reason for ceasing work. As the average of desired retirement has fallen over time, an increased number of individuals would be expected to report health problems for this reason. Second, improvements in medical treatment may have extended life, while simultaneously increasing the number of those reporting health or disability problems (Shepard and Zeckhauser 1980). Third, over time the United States population may have become increasingly aware of and sensitive to health problems. Conditions that in earlier times would not be considered as work preventing or work limiting may today be so regarded. Fourth, there may, in fact, have been an increase in accidents or ill-

nesses, perhaps associated with work-place environment and safety conditions (Verbrugge 1989). Fifth, the demographic structure of the population may have shifted toward those age/sex/race groups with higher prevalence of health problems or work-limiting conditions.

Finally, with the rise in the real value of disability benefits, some may have reported health problems in the process of establishing transfer-program eligibility. This reporting phenomenon has been emphasized in the economics literature, which has viewed individuals as making a choice between continued work and the seeking of disability benefits (Parsons 1980; Haveman and Wolfe 1984a, 1984b).

While some of these speculations suggest changes in underlying impairment/pathology rates, others imply that the observed trends in disability rates are due to changes in the standards on which self-reports are based—that is, changes in the propensity of individuals to report the presence of functional limitations or disability given any level of impairment or the severity of pathologies.

In the absence of a reliable and objective measure of health status or the severity of pathologies (e.g., a medical examination based on intertemporally constant health-appraisal criteria), the contribution of changes in impairment/pathology rates to changes in reported disability rates cannot be determined (see appendix note 1). However, the role of some of the intervening variables affecting changes in disability rates (for example, employment opportunities or the demographic structure of the population) can be identified.

In this article, we attempt to increase our understanding of these puzzling time-related patterns. We first define a statistical measure of disability status, which relies on both the presence of constrained work attributable to health problems or the receipt of disability transfers, which are conditioned on health-constrained work. This definition reflects our attempt to identify underlying pathology resulting in limited work. Then, we apply this definition to working-age observations in a series of current population surveys (U.S. Bureau of the Census 1962–1984) spanning the years 1962 to 1984, and measure the trend over this period in the disability rate indicator and its components. These data have not yet been exploited for this purpose. Having measured the trend in disability, we investigate its correlates in an attempt to shed light on the determinants of disability rate changes. Finally, we identify the role that demographic and economic changes may have played in accounting for this trend.

Disability Defined and Measured

The concept of “disability” is not a straightforward one. Two aspects of it are relevant here. First, is there an objective, generally agreed-upon set of criteria whereby disabled persons can be distinguished from those who are not (or, more generally, whereby individuals who are disabled can be allocated among various categories of disability)? Second, are there reliable statistical proxies for disability suitable for use in social science research on trends in disability, or of the effect of disability on work or mobility?

The most basic and widely accepted “constitutive” definition of disability is that of Nagi (1969, 1979). Nagi distinguishes among “pathology” (the presence of a physical or mental malfunction; the interruption of normal processes), “impairment” (physiological, anatomical, or mental losses or abnormalities that limit a person’s capacities and level of functioning), and “disability” (inability or limitations in performing roles and tasks that are socially expected). This definition of disability, it should be noted, involves *both* social norms regarding activities *and* individual responses to these expectations given the presence of pathologies or impairments. Thus, some individuals with a particular health problem (pathology) may be disabled; others may not. Tastes, age, drive, education, economic conditions, and constitution play a role in determining who is and who is not disabled, holding constant the level of impairments or the severity of pathologies (see appendix note 2).

This approach provides the basis for our definition of disability, i.e., any person who meets either one or both of two criteria related to the ability to engage in paid employment. First, any individual who reports being either unable to work because of health reasons or who works part-time or part of a year because of limiting health conditions is included in the disabled category. This measure, it should be noted, differs from the more commonly used self-reported work-limitations definition. In that definition, individuals directly respond to questions about whether health or physical condition limits the amount or kind of work done, or prevents work altogether. One component of our definition presents conditions on the presence of limited work (i.e., either no work or part-time work), and then attributes disability status to the individual if health or physical conditions are stated to be the cause of the observed limited work. We refer to this definition as the *health-constrained work criterion* (see appendix note 3). Those with only acute

conditions are not included. Second, any individual who receives benefits from public programs with stringent eligibility requirements, including severe and long-term limitations on the ability to work (the Social Security Disability Insurance [SSDI] program, the disability component of the Supplemental Security Income [SSI] program, Railroad Retirement program benefits for the disabled, and Workers' Compensation) is classified as disabled. We refer to this as the *program participation criterion*. Most individuals in our data who are classified as disabled are so categorized by both criteria. All operational definitions that serve as the basis for calculating disability rates require judgement; ours is no exception and it will have to be judged on its own merits. Clearly, some errors and misclassifications will occur (see appendix note 4). "Disability represents a continuum. At whatever point one draws a line, doubtful cases on both sides of the line will remain" (Nagi 1979, 14).

Empirical implementation of this two-pronged definition of disability is adapted from Wolfe (1980), and the specific definitions for each year are stipulated in detail in appendix table 1. These empirical criteria are consistently applied to the adult working-age population (aged

TABLE 1
Percentage of Working-age Population Disabled,
by Criterion and Sex, 1962-1984, Various Years

	Health-constrained work criterion			Program-participation criterion			Either health-constrained work or program-participation criterion, or both		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
1962 ^a	6.0%	4.3%	5.1%	4.8%	1.0%	2.0%	9.5%	4.8%	7.0%
1968	8.4	6.1	7.1	7.2	3.2	5.1	13.0	8.2	10.5
1973	7.7	6.7	7.2	8.3	4.0	6.0	12.8	9.3	11.0
1976	8.9	5.1	6.9	8.4	3.2	5.7	14.6	7.5	10.9
1980	6.5	6.2	6.4	8.1	4.9	6.5	11.9	9.6	10.7
1982	6.3	5.7	6.0	6.9	5.0	6.0	10.6	9.1	9.6
1984	6.6	5.7	6.2	6.5	4.5	5.4	10.5	8.6	9.5

Note: Calculations by the authors from CPS data for various years; see text and appendix tables 1 and 2.

^a Estimates based on unweighted data.

18 to 64) in the public-use files of the March current population survey (CPS) (U.S. Bureau of the Census 1962–1984) for selected years from 1962 to 1984 (see appendix note 5). The sample weights provided in each year's file are attached to each observation in calculating the percentage of the population classified as disabled in each year (see appendix note 6). These data are particularly attractive for reasons of both sample size and the availability of detailed income information.

It should be emphasized that use of disability rates such as those employed here—based as they are on nonobjective measures of pathologies or impairments—in order to track changes in the size and composition of the disabled population is plagued with difficult problems. Because there is no objective criterion for distinguishing who is and who is not disabled, biases can occur if the health-status standards implied by our criteria change over time. For example, if because of changes in social expectations (stigma), prevailing medical standards, administrative leniency in disability transfer program eligibility determinations (see appendix note 7), or tastes for leisure, individuals with identical pathologies or impairments are more likely to be classified as disabled over time, the size of the estimated disabled population will increase intertemporally with no associated change in the prevalence of active pathology or health status (see appendix note 8). Our estimates must be interpreted with this caveat in mind.

The Prevalence of Disability, 1962 to 1984

The disabled working-age population as a percentage of the United States population aged 18 to 64 is shown in table 1 for the period of 1962 to 1984, by gender (appendix table 2 contains detailed estimates). Estimates are shown for each of three criteria for identifying the disabled population: (1) the presence of health constrained work; (2) the receipt of benefits from disability transfer programs reserved for the health impaired; and (3) either or both of (1) or (2). The definition that is used in the remainder of the article is the final one (3), which designates as a disabled person anyone who reports health-constrained work or receives benefits from specified disability income transfer programs.

Using only the health-constrained work criterion, the disabled as a

TABLE 2
 Partial Derivatives from Logit Regression: Determinants of Disability Status,
 Working-age Males, 1962-1984, Various Years (t-statistics in parentheses)

	1962	1973	1980	1984
Race (white = 1)	-1.07 (0.9)	-6.61* (2.6)	-1.18 (1.0)	.66 (0.4)
Age	-.06 (0.5)	-.35 (1.6)	.33* (2.8)	.40* (2.7)
Age spline 35	.10 (0.6)	.04 (0.1)	-.25 (1.5)	-.41* (1.9)
Age spline 54	.13 (0.6)	-.04 (0.1)	.23 (1.0)	.50 (1.6)
Education	-.44 (1.1)	-1.28 (1.3)	-.97 (1.8)	-1.90* (3.1)
Education squared	.01 (0.2)	.03 (0.7)	.01 (0.4)	.04 (1.5)
Never married	-.05 (1.8)	5.67* (2.3)	4.71* (3.4)	6.67* (3.9)
Widower	.86 (0.5)	1.81 (0.6)	2.46 (1.7)	8.60* (4.6)
Veteran status	NA	9.10* (5.6)	5.50* (5.7)	4.77* (3.6)
Unemployment rate	.29 (0.9)	.20 (0.3)	.44* (2.1)	-.03 (0.2)
No. of observations	3,221	2,634	3,495	3,137

NA = Variable not available.

* = Significant at .05 level.

proportion of the total population rose from 5.1 percent in 1962 to over 7.2 percent in 1973, and then declined slowly to 6.2 percent in 1984. The pattern of change over time differed substantially by gender. The proportion of men classified as disabled increased by 50 percent from 1962 to 1976—from 6.0 percent to 8.9 percent—and then fell to 6.6 percent in 1984. Over the entire 22-year period, a 10 percent increase in male self-reported disability was recorded.

The percentage of working-age women who reported themselves as limited in work for health reasons was lower than that of men throughout the period. This is due, in part, to the tendency of women without

work experience or plans to work to report factors other than health as the cause of limited work. The female percentage rose from 4.3 percent in 1962 to 6.7 percent in 1973, then decreased to 5.7 percent in 1984, an increase of 33 percent over the entire period. The somewhat greater increase among women may partly reflect changing social roles reflected in increased female labor-force participation.

Identifying the disabled by applying the program-participation criterion yields the same hump-shaped pattern over time among both men and women, but is marked by more rapid growth early in the period followed by a more substantial decrease after the late 1970s. Whereas 4.8 percent of working-age males received benefits from the stipulated disability transfer programs in 1962, 8.4 percent did so in 1976. The decrease to 6.5 percent in 1984 may reflect federal policies (see appendix note 7 and discussion below) which have tended to reduce the number of transfer recipients through stricter application of eligibility criteria (Halpern and Hausman 1984; Haveman, Halberstadt, and Burkhauser 1984). The time pattern for women falls substantially below that of men throughout the period, reflecting the lower proportion of women who are eligible for disability transfer benefits, which is due in large part to the minimum-quarters-of-work eligibility criterion applied in some of the programs (see appendix note 9).

Disability prevalence employing either the health-constrained work criterion or the program-participation criterion, or both, is shown in the last three columns. Hump-shaped patterns appear there as well. The percentage of working-age men classified as disabled rose from 9.5 percent in 1962 to nearly 15 percent in 1976, then decreased to 10.5 percent. For women, growth until 1980 doubled the percentage, from 4.8 to 9.6 percent, but the proportion declined to 8.6 percent by 1984. Using this more comprehensive definition, the overall prevalence of disability rose from 7 percent in 1962 to about 11 percent in the period of 1973 to 1976, then fell to about 9.5 percent after 1980. Over the entire period, the prevalence of disability increased by 36 percent.

This historical pattern in our series is generally consistent with that of other survey-based research efforts, though some variation in trend patterns are observed. The most prominent survey of health trends is the National Health Interview Survey (NHIS), a periodic survey of the health status of the United States population (Newquist and Robinson 1984; U.S. National Center for Health Statistics 1962-1984). The key

question asked in this survey concerns the effects of chronic health problems on the ability of individuals to perform their major activity. The percentage of such individuals in the working-age population (18 to 64) rose from less than 10 percent in the early 1960s to 11.5 in 1967, 12.7 in 1972, 13.5 in 1977, and to 14.4 in 1980. After 1980, no further increases were recorded; the percentage stood at 13.9 in 1984 and declined to 12.6 in 1987.

Chirikos (1986) reports that *age-adjusted* disability rates for men aged 18 to 64 from the NHIS have risen steadily over the past 30 years. The definition of disability used in the Chirikos study is the self-report of persons that they are limited in the amount or kind of work that they can do, or that they are prevented from working altogether because of a health or physical condition. Plots of this series for males suggest a peak in the disability rate at about 10 percent in 1977, with either no growth or a slight reduction since then. The age-adjusted nature of this series makes direct comparisons with our study difficult. The reduction in the average age of the working age population since the mid-1970s, however, suggests that the elimination of the age adjustment in the Chirikos series would bring it into closer conformance with that reported in table 1 (see appendix note 10).

Finally, Robinson (1988) reports that occupational disabling-injury rates have increased substantially since about 1960 in the manufacturing and wholesale and retail trade industries, but have fallen somewhat since about 1977, yielding a hump-shaped pattern not dissimilar from ours. For the construction and mining industries, however, little overall trend in disabling-injury rates is observed.

The extent to which the patterns we report are related to important policy developments is difficult to establish. It is noteworthy, however, that the application of more stringent medical criteria by the federal government in order to reduce SSDI and SSI rolls, beginning in 1978 and accelerating after 1980 (see appendix note 7 and Burkhauser and Hirvoni 1989), appears to be reflected in the overall disability rate, and especially the percentage of the population classified as disabled by the program-participation criterion (see appendix note 11). These retrenchment efforts apparently had little effect on the post-1980 disability rate as measured by the health-constrained work criterion, a not unexpected result given the low expected probability that those removed from the rolls would be able to find work (see appendix note 12).

The Correlates of Disability Status, 1962 to 1984

The prevalence of disability among the working-age population is determined by a wide variety of factors. The demographic structure of the population and the state of the economy are two such factors. Age, for example, is a recognized correlate—and determinant—of disability status; as the average age of the population increases, the prevalence of disability also tends to increase. Other social and demographic variables—education, race, marital status—have also been identified as correlated with or causal to health status (Kemna 1987). Similarly, economic conditions are widely recognized determinants of both self-reported disability and the receipt of income transfers (Lando 1974; Hambor 1975; Lando, Farley, and Brown 1982; Chirikos and Nestel 1984) (see appendix note 13). Hence, changes over time in both the social and demographic structure of the population and the performance of the economy are likely to be related to intertemporal changes in disability rates.

In addition to changes over time in demographic structure and macroeconomic conditions, the *effect* which these factors have on the probability that a person is classified as disabled may change over time. Age, for example, may have taken a greater toll on the health status of people two decades ago than it does now. Or, because of changes in sensitivities to health conditions—perhaps related to the intensity of medical care usage or prevailing health standards—individuals with equal impairments may be more likely to report themselves as disabled over time. Similarly, being laid off from work may result in more effort to secure disability transfers in a world in which the application of disability benefit program eligibility criteria is lenient than one in which program administrators seek to restrict access to benefits. As distinct from the underlying demographic structure of the population or macroeconomic conditions, these changes reflect *either* changes in pathology/impairment *or* (holding pathology/impairment constant) changes in behavior designed to indicate the presence of pathologies or impairments which constrain work.

In the context of our definition of disability, such behavioral change can take at least three forms. First, holding pathology/impairment constant, individuals may increase their tendency to report illness or impairment as the reason for constrained work. Second, again holding

health status constant, individuals may increase their efforts to receive public transfer income reserved for the work disabled (say, through increased applications for disability transfers or appeals of rejected applications). These changes in reporting or transfer-seeking behavior will reflect the individual's own assessment of the seriousness of the impairment (which assessment will reflect social norms and medical opinion), his/her view of the reaction of peers to a declaration that he/she is disabled, the program benefits that may be associated with a declaration of disability, opportunities for employment which reflect employers' willingness to hire workers with physical or mental limitations, and the person's preferences for continued work versus retirement. A third change reflects the behavior of public program administrators rather than individual efforts. Increases in the leniency with which program-eligibility criteria are applied may also be reflected in our measure of disability without a commensurate change in pathology/impairment. Note that while a number of these factors reflect individual tastes and preferences (e.g., as between earnings and leisure), others reflect social norms, customs, and administrative standards and practices. Hence, a change in the disability rate using our definition reflects both changes in pathology/impairment and change in and of the three behaviors distinguished above. Without detailed physical and mental examinations based on an intertemporally constant and objective set of criteria, changes in pathology/impairment cannot be distinguished from changes in reporting or benefit-seeking behaviors, or the practices of transfer program administrators in accounting for changes in disability rates.

To examine the effect of a variety of demographic and macroeconomic factors on the level of reported disability, we fit a logit model to weighted observations in our microdata files for the earliest and the latest years of observations, and for two intermediate years. The dependent variable takes on the value of 1 if the individual is disabled and 0 if not, under the comprehensive, either-or-both disability criterion. In interpreting the results of the estimated model, the coefficients reflect both the extent of pathology/impairment and the behaviors noted above; the values of the independent variables (either mean values or other selected values) reflect the demographic structure of the population or macroeconomic conditions.

A variety of independent variables reflecting demographic and macroeconomic determinants of disability status are employed. *Age* is an obvious determinant, reflecting deterioration of health capital with

time (Grossman 1972) (see appendix note 14). *Education* reflects the efficiency of time spent in health-producing activities and in the use of medical care, and is also consistent with Grossman's model. It also serves as a proxy for permanent income and hence the quality of life. *Gender* reflects both potentially different levels of true impairment between males and females, and sex-based differences in work history (relevant to the probability of being eligible for disability program benefits). *Race* is employed to reflect potential discrimination in access to health care as well as employment, and also as a proxy for permanent income and the quality of life. *Marital status* also reflects the rate of health deterioration, as the support and care which accompanies marriage and cohabitation tends to foster additional health maintenance investments (Bartel and Taubman 1979). *Veteran status* (for males) reflects the higher risk of war-related injuries, and the *presence of children* (for females) captures both the time demands required for child care, which demands reduce time available for either health-related investments or for labor-market earnings (Haveman and Wolfe 1983) and whatever health effects may be related to childbearing and raising. Finally, the *rate of unemployment in the state in which an individual resides* captures the potential effect of macroeconomic conditions on self-reports of disability (Lando 1974; Hambor 1975). The estimates are done separately by gender, reflecting the disparate levels of program benefit reciprocity between men and women.

Tables 2 and 3 present the partial derivatives (defined at the mean unless otherwise specified) for these regressions for males and females, respectively, for 1962, 1973, 1980, and 1984. (The logit regressions themselves are available from the authors upon request.) These results indicate that, *ceteris paribus*: (1) nonwhite status is positively related to the probability of being classified as disabled; (2) age is generally positively related to the probability of being disabled (though the pattern for those 54 years old or older differs between the genders); (3) those with more years of schooling are less likely to be classified as disabled; (4) being unmarried, a veteran (for men), and having no children in the household (for women) increases the probability of disability status; (5) having poorer employment prospects (as reflected in the unemployment rate of the individual's state) increases the probability of being classified as disabled; and (6) the presence of children (for women) reduces the probability of being disabled. With the exception of the presence of children (for women) all of the signs are as expected.

TABLE 3
 Partial Derivatives from Logit Regression: Determinants of Disability Status,
 Working-age Females, 1962-1984, Various Years (t-statistics in parentheses)

	1962	1973	1980	1984
Race (white = 1)	-.11 (1.8)	-5.20* (3.1)	-1.00 (1.0)	-3.35* (2.6)
Age	.02* (2.8)	.24 (1.6)	.24* (2.3)	.35* (2.7)
Age spline 35	-.02* (2.7)	.16 (0.7)	-.01 (0.1)	-.06 (0.3)
Age spline 54	.03* (2.4)	-.68* (2.0)	-.42* (2.0)	-.68* (2.6)
Education	-.02 (1.2)	-2.04* (2.6)	-.38 (0.8)	-1.45* (2.5)
Education squared	-.00 (0.5)	.05 (1.4)	-.03 (1.4)	.02 (0.7)
Never married	.08 (1.1)	14.46* (3.6)	6.96* (4.3)	9.02* (5.0)
Widower	.25* (3.6)	17.46* (9.0)	10.62* (9.3)	10.83* (7.9)
Presence of children	-.38 (0.4)	-.47* (2.5)	.32 (1.1)	-.80* (2.0)
Unemployment rate	.01 (0.3)	.64 (1.3)	.10 (0.5)	-.06 (0.3)
No. of observations	3,632	3,047	3,705	3,372

* = Significant at .05 level.

While the signs of the partial derivatives are generally consistent over time, the magnitude of the marginal impact of some of the determinants of disability status changes over time, sometimes substantially. A few of these patterns are noteworthy. For men, age has become a more important determinant of being disabled over time. In the early 1960s, there is but weak evidence that age contributed to the probability of being disabled when the other factors are controlled for. By 1984, however, age over 54 is significantly and positively related to being classified as disabled. This is consistent with the substantial increase in early retirement among older men during recent decades (see appendix note 5). The opposite pattern holds for older women, and it too is consistent with changes in female labor-force participation. Throughout the

period, years of education are negatively associated with the probability of being disabled for both men and women. With the exception of 1962, the partial derivatives on the marital status (for females) and veteran status (for males) variables are very large and significant (see appendix note 15).

Changes in Disability Rates among Prototypical Individuals: 1962–1984

Using the four annual, cross-section logit regressions, we calculate the intertemporal trends in disability status for eight prototypical individuals, specifically designed to characterize groups with low economic and labor force status. By holding the age/demographic characteristics of—and the macroeconomic conditions facing—these individuals constant over the logit regressions, we predict for each individual the probability that he/she will be classified as disabled in each of the years from 1962 to 1984. This probability for each year and prototypical individual reflects the combined effect of the level of pathology/impairment and behaviors affecting the reported health-constrained work and program participation. The following prototypes are identified:

1. A 21-year-old black never-married female with 10 years of education and two children, facing a 15 percent unemployment rate (young, unmarried black mother).
2. A 40-year-old white married female, no children and 12 years of education (middle-aged white wife).
3. A 60-year-old white widow, no children and 12 years of education (older white widow).
4. A 60-year-old black never-married female, no children, facing a 15 percent unemployment rate (older black female).
5. A 21-year-old never-married nonveteran black male with 10 years of education, facing a 20 percent unemployment rate (young black male).
6. A 40-year-old white married male, who is a veteran with 12 years of education (middle-aged white male).
7. A 60-year-old white veteran widower with 12 years of education, facing a 15 percent unemployment rate (older white widower).
8. A 60-year-old black, never-married, nonveteran, with 9 years education, facing a 20 percent unemployment rate (older black male).

TABLE 4
 Estimated Probabilities (expressed as percentages) That Specified, Prototypical
 Individuals Will Be Classified as Disabled, Selected Years, 1962-1984

	1962 ^a	1973	1980	1984
<i>Total female percentage</i>	4.8%	9.3%	9.6%	8.6%
1. Young unmarried black mother	.1	23.1	12.4	13.4
2. Middle-aged black wife	2.2	9.0	6.2	7.8
3. Older white widow	5.5	33.7	25.0	25.2
4. Older black female	8.1	48.0	32.0	42.4
<i>Total male percentage</i>	9.5	12.8	11.9	10.5
5. Young black male	4.9	16.8	8.3	10.1
6. Middle-aged veteran	6.1	20.4	12.7	13.3
7. Older white widower	9.3	33.4	23.6	32.6
8. Older black male	6.4	37.7	24.3	26.2

^a Estimates based on unweighted data.

For each year, the identified characteristics of each prototypical individual (together with the gender-specific means of the remaining variables) are used with the coefficients of the estimated logit regression to calculate the probability that the individual would be classified as disabled. The year-to-year change in the calculated probability for any prototype is interpreted as the combined effect of changes in the level of pathology/impairment and behaviors affecting reported health-constrained work and program participation for individuals with the stipulated set of characteristics. Table 4 reports these simulations.

Several patterns are noteworthy. First, age is a predominantly strong factor in determining disability prevalence over time and across groups; older males and females are far more likely to be classified as disabled, irrespective of race and other characteristics, than are younger individuals. Second, several of the prototypical individuals show far larger changes in disability prevalence over time than the total male or female populations. Especially those with tenuous ties to the labor market (the females and the younger and older males) experienced very large increases in the probability of being disabled from 1962 to 1973. For example, the older white widow (widower) indicated a six-fold (three-fold) increase in disability prevalence from 1962 to 1973, while the aggregate female (male) rate doubled (increased by one-third). This pattern is

consistent with the conclusion of several research studies and other observers that public transfer programs reserved for the work impaired grew increasingly lenient during this period, and were more likely to consider vocational opportunities in the application of eligibility criteria (Haveman, Halberstadt, and Burkhauser 1984). Third, the pattern for the young individuals is an interesting one. In 1962 the prevalence of disability among both young black males and black females was lower than that for the entire male and female population. By 1973 the disability rate of these young populations was in excess of that for the relevant aggregate sex groups. By 1984, however, disability prevalence for young black males had fallen below that of all males; that for young black females had fallen from 2.5 to 1.5 times the aggregate female rate. The surge in black youth disability prevalence in 1973 was, in subsequent years, eroded but has not returned to its low pre-1970 level. Finally, while the disability prevalence pattern for older individuals, both males and females, shows the surge from 1962 to 1973 for the other vulnerable groups, it tailed off only slightly after the mid-1970s. For all four older prototypical individuals, the disability prevalence rate in 1984 exceeded 25 percent. These changes are consistent with a re-orientation of publicly administered transfer programs for the work disabled toward increasing leniency (generosity) to the older population and increasing stringency toward younger populations who are viewed as more employable.

The Impact of Changes in Demographic and Macroeconomic Factors on Disability Rates: 1962-1984

The annual logit regressions can also be used to simulate disability rates for the male and female populations at various points in time and under various constellations of (1) demographic characteristics, (2) macroeconomic conditions, and (3) the combination of pathology/impairment and behaviors affecting reported health-constrained work and program participation. In this way, the relative roles of these factors in accounting for the change in overall disability prevalence can be identified. This simulation explores the effects of these factors during two periods—from 1962 to 1973 and from 1973 to 1984 (see appendix note 16).

For each time period, the simulation first uses the means of the

demographic variables of the logit regressions in the early year with the coefficients for both the early and later years, thereby calculating the probability that the individual with the mean set of demographic characteristics in the early year would be classified as disabled in both the early and late years. (The unemployment rate is assumed to be unchanged.) The resulting change in the calculated probability is due to the change in the estimated coefficients alone, and hence is interpreted as the effect of the change in either pathology/impairment or behaviors affecting reported health-constrained work and program participation of the mean individual. In the second step, the logit coefficients in the early year are used together with the means of the demographic variables for both the early and late years. The resulting estimates yield the change in the predicted disability rates which is attributable only to change in the *demographic structure*, including age structure, of the population over the period. (Again, the unemployment rate is kept unchanged [see appendix note 17].) Finally, the effect of the change in the *macroeconomic conditions* from the early to the late year is estimated, using the mean unemployment rate in the two years with the (appropriately transformed) logit coefficients of the late year (see appendix note 18).

The results of these simulations are shown in table 5. For both genders and time periods, the changes in pathology/impairment or the behaviors of individuals and program administrators dominates the estimated change in overall disability rates; at least 85 percent of the change is attributable to changes in this combination of factors. The effect of changes in the *demographic structure* of the population is mixed. For males, the changing age/demographic structure contributed to a decrease in disability prevalence over the entire period from 1962 to 1984, offsetting the increasing prevalence in the first one-half of the period, and reinforcing it in the second one-half. For females, the change in age/demographic structure worked in the opposite direction, increasing disability prevalence throughout the period. Changes in the unemployment rates over the period—an indicator of macroeconomic performance—had virtually no effect on the prevalence of disability.

Conclusion

Our exploration of the changing intertemporal prevalence of disability from 1962 to 1984 has established a distinct hump-shaped pattern, it-

TABLE 5

Simulated Change in the Prevalence of Disability Attributable to Change in (1) Demographic Structure, (2) Macroeconomic Conditions, and (3) Pathology/Impairment or Individual/Administrative Behavior, Working-age Males and Females, Selected Periods, 1962-1984, in Percentage of Change in Predicted Prevalence

	Male		Female	
	1962-1973	1973-1984	1962-1973	1973-1984
Change in measured prevalence (in percentage points)	+3.3%	-2.3%	+4.5%	-.7%
Percentage of change in predicted prevalence attributable to:				
Changes in demographic structure	-4.9	-25.7	+0.0	+15.0
Changes in macroeconomic conditions	-0.0	+0.0	+0.0	+0.0
Changes in pathology/impairment or individual/administrative behavior	+99.0	-85.1	+97.3	-100.0
Residual	+5.9	+10.8	+2.7	-15.0

respective of criterion, age, or gender. The 1970s witnessed a peak in prevalence (earlier for the health-constrained work criterion, later for the program participation criterion). The policy retrenchment efforts in the period after the mid-1970s are reflected in the series.

The underlying demographic determinants of disability prevalence were explored through a series of logit regressions and simulations based on them. The resulting racial, age, education, and marital status effects are not unexpected, although these patterns have changed over time. For example, consistent with gender-specific labor-force participation patterns, age is increasingly related to disabled status for men, but not for women.

We then explored the intertemporal pattern of disability prevalence—first, for eight prototypical individuals, many with tenuous ties to the labor market, and then overall. A large increase in prevalence for all of the groups was observed from 1962 to 1973, a period in which the generosity of disability transfers was increasing and access to them was becoming less difficult. Females and older workers experienced the most dramatic increases in this period. A moderate decrease in disability prevalence

from its 1973 peak was observed for all of the groups by 1984. Finally, in simulations designed to ferret out the separate contributions of demographic structure and macroeconomic conditions from either pathology/impairment or behaviors affecting reported health-constrained work or program participation, we found that the overwhelming bulk of changes in disability prevalence can be attributed to changes in the pathology/impairment-behavior factor. Demographic changes, including the changing age of the population, are an important factor in only the period from 1973 to 1984.

Although the separate roles played by pathology/impairment, the propensity to report health-constrained work, and the administrative stringency of public transfer programs cannot be distinguished without microdata that include an objective and intertemporally constant health appraisal, it seems unlikely that changes in pathology/impairment alone could have accounted for the radical changes in the disability rates which we have observed. A more plausible explanation is that a substantial share of the measured changes in disability rates is due to changing patterns in the propensity of individuals to report health problems as the reason for constrained work or to receive transfer benefits which are conditioned on health-constrained work. This conclusion is consistent with that of Chirikos (1986), who suggested that perhaps one-third of the rise in disability rates has been due to socio-economic factors, and with that of Baily (1987), who concluded on the basis of disparate pieces of evidence that the upward trend in self-reported disability is attributable to changed attitudes accompanying changes in the leniency and generosity of disability transfer policy, and not to changes in pathology/impairment of the working-age population.

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Appendix Notes

1. This conclusion is also true with respect to trends in self-reported impairments and pathologies (e.g., physical-sensory impairments and chronic conditions), which Chirikos (1986) finds to have been rising along with self-reported disability.
2. In the Nagi framework, the linkage between poor health (pathology) and disability (defined so as to include the ability to carry out certain socially accepted functions) is a complex one, and is shaped by a variety of noneconomic and economic factors. Thus, a failure of an organ may cause a functional limitation or an impairment, depending on a person's genetic disposition, age, usage, or medical care and so on. If these factors are held constant, positive relations between the severity of pathologies and the level of impairments would be expected. Similarly, not all persons with impairments are disabled; age, employment and transfer opportunities, constitution, and other factors are also relevant. Holding these factors constant, however, a larger number or increased severity of impairments would be associated with higher disability rates. If all of these intervening factors are held constant, higher disability rates would imply higher prevalences of pathology. In this framework, changes in disability rates can be decomposed into

changes in pathology/impairment rates, holding other factors constant or changes in the other factors, holding constant changes in pathology/impairment rates. We are indebted to the comments of a referee of the *Milbank Quarterly* for this interpretation of the Nagi framework to our study.

3. The health-constrained work definition would be inappropriate for use in behavioral (e.g., labor supply) studies, conditioned as it is on observed work activities (see Rones 1981). In identifying those who are disabled, however, it has the advantage over the more commonly used work-limitation definition of ensuring that work effort is indeed limited, and not just asserted to be constrained.
4. The range of approaches to measuring disability—and their policy implications—are discussed in Stone (1984). See also Haber (1967); Howards, Brehm, and Nagi (1980); Berkowitz, Johnson, and Murphy (1976); and Haveman, Halberstadt, and Burkhauser (1984). With respect to the variety of efforts to develop operational measures of disability, Nagi (1979) has stated:

Several difficulties characterize these measures: they are based on reports of the disabled or the assessments of clinical personnel, and therefore suffer from subjective influences; they are more reliable in identifying extreme cases, and lose efficiency in the middle ranges; applying such scales does not yield cumulative results; and many scales measure capacities in ways that are not meaningful unless the capacities are matched with requirements of tasks and roles (for example, the capacity to lift certain weights must be matched with lifting requirements of certain tasks in order to assess the ability-inability of a person to perform that work).

5. To some extent, including persons aged 62 to 64 in the working-age population may confound trends in early retirement patterns (perhaps related to OASI early retirement benefits that became available in 1961) with trends in work disability. Similarly, changed school-leaving and educational policies may affect those aged 18 to 22 and thus influence our measured disability rates. The standard retirement age, however, remains 65 years and the standard definition of the working-age population includes ages 18 to 64, and that is the basis for our definition. Our results should be interpreted with these caveats in mind.
6. The CPS is used to report persons with work disability in the *Statistical Abstract of the United States* (U.S. Bureau of the Census 1962–1984). We prefer it to such sources as the National Health Interview Survey (NHIS) which is based solely on self-reported health conditions (Gallin and Given 1976). As appendix table 1 indicates, the CPS allows the disabled to be identified by both self-report of the reasons for not working or working part-time and

program participation criteria. Moreover, the CPS has not been affected by changed definitions and survey techniques, as has the NHIS (Wilson and Drury 1981; Bailey 1987). Population weights are available for all years except 1962.

7. The 1980 Social Security Administration (P.L. 96-265) required the secretary of the Department of Health and Human Services to review all beneficiaries for eligibility through continuing disability reviews (CDRs). In 1983 this was modified to allow a waiver authorization depending on staffing and backlog. This was a reaction to the controversy generated by the process. The CDRs began in March 1981; 1.2 million cases were reviewed in the next 3.5 years, and 41.2 percent were found ineligible for continuing eligibility. Between 1981 and 1984, 315,910 people were removed from the rolls on the grounds that they were ineligible to receive benefits. By June 1987, a U.S. General Accounting Office (1989) review found that 63 percent of them (199,079) had won back their benefits; an additional 7 percent (21,176) had died, 4 percent had begun to receive Social Security retirement benefits, while others never appealed.
8. Chirikos (1986) found that self-reported physical and sensory impairments have increased as disability increased. Because these impairment rates are based on self-reports, however, the fundamental issue of the basis of increased disability remains unanswered.
9. As will be clear in our later discussion, interpretation of time-related patterns under this criterion is difficult. Changes in the number of recipients of disability transfers—even applying a “totally and permanently disabled test”—can reflect changes in individual labor supply, social changes in benefit generosity or leniency, changes in knowledge regarding benefit availability, changes in the presence of disease or limiting conditions, or all of these.
10. Other data permitting some intertemporal comparisons include the United States Bureau of the Census and Social Security Administration survey questions regarding limitations on or complete inability to work. A spliced series from these data sources indicates a peak in age-adjusted disability prevalence in the mid- to late-1970s. See Chirikos (1986).
11. Other policy changes may have affected the observed patterns as well. For example, increases in successful applications for SSDI benefits may encourage decisions to leave the work force in order to apply for benefits. Similarly, both benefit-replacement rates and employer alterations of work-place environments in response to health conditions may influence the probability of job exit. See Burkhauser and Kim (1990).

APPENDIX TABLE 1
Criteria for Classification As Disabled

	Disability program participation criterion	Health-constrained work criterion
1962	<p>1. Receives Social Security, is not in school, and is aged between 19 and 61, or receives Social Security, is in school, and is aged between 23 and 61, or</p> <p>2. Receives Social Security (and other unearned income), is not currently working, and reason not working is ill or unable to work; or receives Social Security (and other unearned income), and is a male currently working \leq 10 hours per week.</p>	<p>1. Employment status or major activity last year = unable to work, or main reason not working is ill, or</p> <p>2. Usually works < 35 hours and reason for part-time work = own illness or reason worked part year last year = own illness, or</p> <p>3. Has job, but not working, and reason not working is own illness.</p>
1968	<p>1. Receives Social Security or Railroad Retirement benefits, is not in school, and is aged between 19 and 59, and is not a widow with a dependent child, or receives Social Security, is in school, and is aged between 23 and 59, or</p> <p>2. Receives disability welfare/public assistance benefits (that is, receives welfare/public assistance, excluding those whose marital status is separated, widowed, or divorced, or other with dependent children, and excluding those unemployed during year), or</p> <p>3. Receives Workers' Compensation (that is, receives unearned income from Workers' Compensation, unemployment compensation, government employee pension, or veterans' benefits; and [a] employment status or major activity = unable to work, or [b] reason not working, working part year is own illness, and [c] not unemployed during year, not in government work), or</p>	<p>1. Employment status or major activity last year = unable to work, or</p> <p>2. Usually works < 35 hours and reason for part-time work = own illness or reason worked part year last year = own illness, or</p> <p>3. Has job, but not working, and reason not working is own illness</p>

4. Receives veterans' disability benefits (that is, receives unearned income from Workers' Compensation, unemployment compensation, government employee pension, or veterans' benefits; is a veteran and was not unemployed, in school, or a government worker).

1973

1. Receives Social Security or Railroad Retirement benefits, is not in school, is aged between 19 and 59, and is not a widow with a dependent child; those aged 23 and over may be in school, *or*
2. Receives disability welfare/public assistance benefits (that is, receives welfare/public assistance, excluding those whose marital status is separated, widowed, divorced, or other with dependent children, and excluding those unemployed during year), *or*
3. Receives Workers' Compensation, *or*
4. Receives veterans' disability benefits and is a veteran and not in school.

1976,
1980,
1982,
1984

1. Receives Social Security or Railroad Retirement benefits, is not in school, is aged between 19 and 59, and is not a widow with a dependent child. Those aged to 23 to 59 may be in school, *or*
2. Receives SSI disabled benefits, *or*
3. Receives Workers' Compensation, *or*
4. Receives veteran's disability benefits, is a veteran, and is not in school.

1. Employment status or major activity last year = unable to work, *or*
2. Usually works < 35 hours, and reason for part-time work = own illness or reason worked part year last year = own illness, *or*
3. Has job, but not working, and reason not working is own illness.

1. Employment status or major activity last year = unable to work (P133 = 1, 1976 tape), *or*
2. Usually works < 35 hours and reason for part-time work = own illness or reason worked part year last year = own illness (P18 = 2 and P29 - 20 = 10 or P145 = 1, 1976 tape), *or*
3. Has job, but not working, and reason not working is own illness (P23 = 2 and P21 = 1 on 1976 CPS).

12. The proportion of those removed from the rolls in the early 1980s who ultimately found work is small. See Treitel (1976) and Bound (1989). Bound also finds that applicants rejected for SSDI do not return to regular work.
13. Numerous other determinants of disability rates have also been cited in the literature, including the kind of medical conditions, the nature of functional limitations, the character of the job prior to the onset of a condition (e.g., occupation, industry, skill requirements), the availability of disability-related transfer income, and so on. See Chirikos (1986), Colvez and Blanchet (1981). As information on these variables is not available in our data, they will not be considered further here.
14. Age is specified as a spline function with breaks at ages 35 and 54. Such a specification models age as a continuous variable, but with discrete links at the specified ages. The partial derivative for individuals aged 18 to 34 is derived from the coefficient on age; that for individuals aged 35 to 53 (54 to 64) from the age coefficient

APPENDIX
Percentage of Working-age Population Disabled, by

	1962 ^c			1968			1973		
	M	F	All	M	F	All	M	F	All
<i>Program participation</i>									
SSI	NA	NA	NA	1.1%	1.3%	1.2%	1.4%	2.3%	1.9%
SSDI	NA	NA	NA	1.4	1.1	1.2	1.5	1.4	1.4
WC	NA	NA	NA	NA	NA	NA	1.6	.4	.9
VET	NA	NA	NA	5.2 ^a	.9 ^a	2.9 ^a	4.5	--	2.1
All programs	4.8%	1.0%	2.0%	7.2	3.2	5.1	8.3	4.0	6.0
<i>Work health constrained</i>									
NOTWORK	2.2	1.7	2.0	3.2	2.4	2.8	3.5	3.3	3.4
LESSWORK	3.8	2.6	3.2	5.6	3.7	4.6	4.5	3.5	3.9
All work limitations	6.0	4.3	5.1	8.4	6.1	7.2	7.7	6.7	7.2
<i>All disabled</i> ^b	9.5	4.8	7.0	13.0	8.2	10.5	12.8	9.5	11.0

NA = Not available; M = Male; F = Female.

-- = Not applicable.

^a WC plus VET.

^b Using either criterion or both.

^c Estimates based on unweighted data.

and the coefficient on the age spline 35 (and age spline 54) variable(s).

15. The CPS data for 1962 are from the earliest of the current population surveys (U.S. Bureau of the Census 1962-1984) that have been publicly released. Our work with these 1962 data revealed several problems, including the absence of weights necessary to reflect the actual composition of the population. Hence, we place substantially less confidence in the estimates for that year than for the later years. The large difference in partial derivatives between that year and the later years is evidence of this problem.
16. The period from 1962 to 1973 is that of the rapid surge in disability prevalence, while that from 1973 to 1984 shows an erosion in disability rates. In Table 1, 1973 shows the highest disability rate in the observed post-1960 period. An alternative estimation could have separated the two periods at 1976, when the period of increased stringency in the application of federal disability eligibility

TABLE 2
Criteria and Sex, 1962-1984, Various Years

1976			1980			1982			1984		
M	F	All	M	F	All	M	F	All	M	F	All
1.2%	1.2%	1.2%	.7%	1.3%	1.0%	.8%	1.6%	1.2%	1.1%	1.3%	1.2%
1.8	1.7	1.8	2.3	2.8	2.6	2.2	2.7	2.4	1.8	2.2	2.0
1.9	.5	1.2	2.4	1.1	1.7	1.9	1.1	1.5	2.0	1.1	1.6
4.5	--	2.1	3.4	--	1.6	2.7	--	1.3	2.1	--	1.0
8.4	3.2	5.7	8.1	4.9	6.5	6.9	5.0	6.0	6.5	4.5	5.4
6.2	3.5	4.8	4.3	3.7	4.0	4.0	3.5	3.7	4.1	3.4	3.8
2.7	1.6	2.2	2.3	2.6	2.5	2.3	2.3	2.3	2.5	2.3	2.4
8.9	5.1	6.9	6.5	6.2	6.4	6.3	5.7	6.0	6.6	5.7	6.2
14.6	7.5	10.9	11.9	9.6	10.7	10.6	9.1	9.8	10.5	8.6	9.5

criteria is asserted to have begun. The basic patterns observed in table 5 remain unchanged.

17. An alternative decomposition which uses the means of the later year with the coefficients from the early and late years to measure the changed response due to pathology/impairment or reported health constraints on work, and the coefficients from the later year together with the mean characteristics for the early and late years, yields essentially the same pattern as that reported in the text.
18. Using the state-specific unemployment rate in the logit regressions captures the cross-section relations between labor demand conditions and disability rates. In this simulation it is assumed that the relation between aggregate labor demand conditions in the economic disability rates over time is accurately reflected in the estimated cross-section relations. To the extent that the economy-wide economic cycle has a different effect on disability rates than that reflected in the cross-section estimate, our results will contain some bias.

Cognitive Impairment among Functionally Limited Elderly People in the Community: Future Considerations for Long-term Care Policy

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THERE ARE COMPELLING REASONS TO IMPROVE OUR knowledge of cognitive impairment among elderly people, and, in particular, its functional consequences. The gradual loss of independence resulting from diseases like Alzheimer's and its effects on victims and those caring for them has been graphically depicted in both academic and popular forums. Efforts to develop policy regarding provision of long-term care services, however, have raised a number of questions about the link between cognitive impairment and functional status. Paramount among them is whether functional status measures based on performance of routine daily activities, generally regarded as adequate indicators of the need for long-term care assistance, capture the full range of disabilities resulting from cognitive impairment. If not, some suggest additional functional or behavioral criteria should be considered to extend coverage for services to as many of the cognitively impaired as possible. Evidence that caring for cognitively impaired individuals is particularly stressful is cited in support of this position.

The use of research-based measures of functioning to formulate legislation has made the relation between these measures and cognitive impairment of more than academic interest. Ability to perform "activities of daily living" was the primary basis for eligibility in all major bills proposing coverage of home and community-based long-term care services in the 100th Congress of the United States. Congress's Biparti-