The Illusion of Failure: Trends in the Self-Reported Health of the U.S. Elderly

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IN THE 1970S, AGE-SPECIFIC MORTALITY RATES FOR older populations in the United States began to decline rapidly. Theoretically, the effect of a decline in mortality on the health of the surviving population is ambiguous (Shepard and Zeckhauser 1980; Manton 1982; Feldman 1983). Although age-specific mortality declines represent improvements in health (Fries 1980), those saved from death may tend to be frail (Gruenberg 1977). The fact that falling mortality from chronic diseases accounted for most of the mortality decline in the 1970s supports the belief that the health of older populations is declining (Olshansky and Ault 1986).

The strongest empirical support for the notion that recent mortality declines among the elderly have been associated with increased frailty and worsening health—the "failure of success"—has come from survey data. During the 1970s, the National Health Interview Survey (NHIS) showed increasing proportions of middle-aged and older Americans identified as limited in their capacity to perform normal activities (Verbrugge 1984, 1989; Baily 1987; Colvez and Blanchet 1981) and as suffering from a number of potentially disabling chronic conditions (Verbrugge 1984; Colvez and Blanchet 1981; Chirikos 1986). Researchers at the National

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Center for Health Statistics have highlighted several methodological and conceptual issues that may complicate the interpretation of these trends (Wilson and Drury 1984). Although the relative validity of these issues has not been systematically evaluated, gerontology researchers have generally interpreted these data to imply that average health status was deteriorating among the older population during the 1970s (Verbrugge 1984, 1989; Colvez and Blanchet 1981; Chirikos 1986; Crimmins 1990; Crimmins and Ingegneri 1993, 1994).

We will examine trends in mortality and in several self-reported health measures from the 1970s through the 1980s. Despite continuing trends toward increasing life expectancy during the 1980s, we find that the trends in most self-reported health measures changed dramatically. The 1980s saw *declines* in the fraction of the older population identified as limited in their ability to perform normal activities and also in the fraction identified as in fair or poor health (Verbrugge 1989; Crimmins 1990; Crimmins and Ingegneri 1993, 1994; Ycas 1987). Moreover, as we will demonstrate, prevalence rates for the chronic conditions most likely to be disabling either remained stable or fell.

The reversal of the trend in self-reported health between the 1970s and 1980s would appear to belie the view that mortality declines necessarily imply worse health. However, we believe that the patterns during the 1980s also call into question whether tendencies in self-reported health during the 1970s reflected worsening health of the surviving elderly. We argue that the most plausible explanation for these trends is not a worsening of the average health of the population, but rather a combination of social forces affecting the way individuals perceive their own health and report on it.

First, public and private efforts at disease prevention and at early detection of potentially disabling conditions grew dramatically in the 1970s. We argue that these efforts led to earlier diagnosis of preexisting conditions during the period under study. Second, income maintenance programs for the disabled also expanded in the 1970s, providing some individuals with preexisting conditions the economic means to leave the labor force earlier than they otherwise could have. We argue that self-reported health measures are sensitive to the availability of these programs because individuals' views of their health, particularly of their ability to perform their "normal" activities, may differ depending on whether they are working or are receiving disability insurance.

In the next section, we present the trends in self-reported health as derived from nationally representative data. In "The Size of the Mortality Decline," we use information from vital statistics to measure the potential magnitude of the effects of mortality decline on the frailty of the surviving population. Finding that observed trends in mortality and self-reported health provide little support for the "failure of success" hypothesis, we then turn to possible alternative explanations. We go on to examine trends in the availability of income maintenance programs for the disabled. We find support for the hypothesis that observed trends in self-reported activity limitations represent changes in the way individuals responded to preexisting conditions rather than representing actual declines in health. In the section entitled "Early Diagnosis and Trends in Self-Reported Chronic Conditions," we examine evidence from direct clinical data and other indirect sources, and we find support for the hypothesis that increases in the prevalence of self-reported chronic conditions during the 1970s resulted from earlier diagnosis of preexisting conditions. We conclude with a summary of our argument and a discussion of the significance and implications of our view that social factors have an important impact on reporting behavior.

Trends in Self-Reported Health

Each year since 1957 the National Health Interview Survey, conducted by the National Center for Health Statistics (NCHS), has interviewed a large number of households representing over 100,000 individuals. Starting in 1969, the first year for which microdata from the survey are available, we have charted population trends in the three types of *self-reported* health measures most related to chronic illness:

1. activity limitations
2. general health status
3. the presence of chronic conditions

Because the NHIS underwent a major design change in 1982, we present trends for 1969–81 and for 1982–91 separately. All population rates used in the analyses are directly standardized to the age distribution of the 1980 U.S. Census, using five-year age intervals.

Activity Limitation

The NHIS asks individuals whether they consider themselves limited in their ability to perform various activities for reasons of health. Until

1982, all adult respondents were asked whether they were (1) *unable* to perform their "major activity" because of health problems; (2) *limited* in their ability to perform their major activity; and (3) limited in any activity. The questionnaire was structured such that men were always asked about their capacity to perform paid work, whereas women who identified their major activity as "keeping house" were asked about their capacity to do housework.

Starting in 1982, three changes were implemented (Kovar and Poe 1985). First, the question asking respondents to identify their "major activity" was changed in order to give both men and women the same list of alternatives (working, keeping house, going to school, or something else). Second, regardless of what was identified as their major activity, all individuals under the age of 70 were asked specifically about their ability to work. Those who did not report their major activity as "working" were asked a set of follow-up questions that allowed the construction of a work-limitation response. We present both the proportion identified as limited or unable to do their major activity and the proportion identified as limited or unable to work; the figures demonstrate the importance of this distinction for women and its lack of importance for men. In addition, the questionnaire was changed completely for those over the age of 69. After 1982, these individuals were asked about activities of daily living (ADLs), such as personal care, shopping, personal business, and household chores.

Figure 1A–C presents trends in activity limitations. The measures presented are inclusive: "any limitation," for example, includes people in the categories "major activity limitation" and "unable to perform major activity." Figure 1A shows that for most measures of activity limitation, reported prevalence of limitation among men and women aged 45 to 64 increased during the early 1970s and stayed flat or decreased in the late 1970s and 1980s. The one exception to these general trends is the proportion of women aged 45 to 64 reporting themselves as unable to perform their "major activity," which stayed flat throughout the 1970s and rose sharply in the 1980s. However, this discrepancy seems to be due to the difference between what men and women identify as their major activity. After 1982, when both men and women were asked explicitly about their ability to work, both the levels and trends in responses are similar.

For those aged 65 to 69 (fig. 1B), trends in activity limitation exhibit much the same patterns as for the younger group. Trends for the oldest group (fig. 1C) show no clear pattern during either the 1970s or the

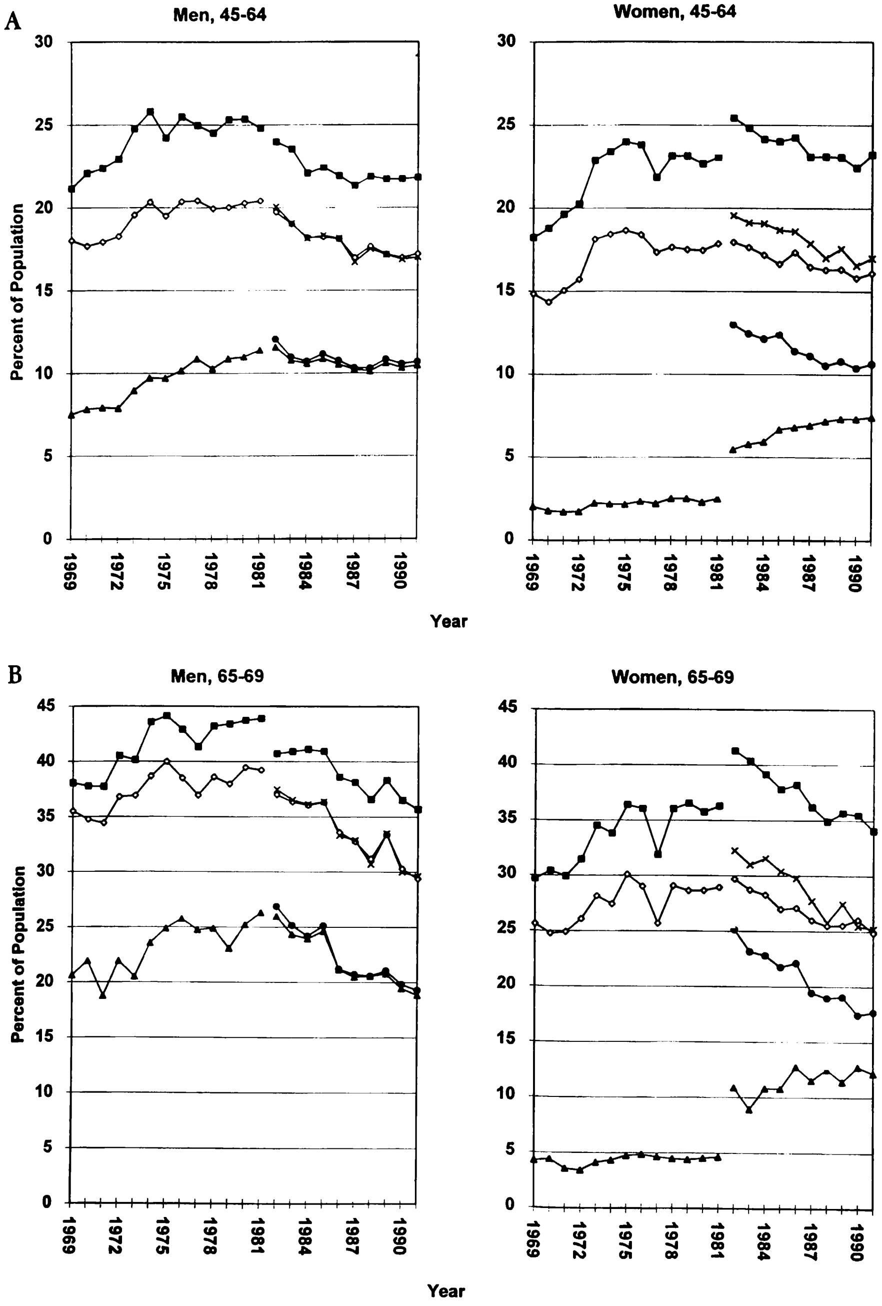

FIG. 1. Trends in self-reported activity limitation from 1969 to 1991. All percentages are directly standardized to the 1980 age distribution of the noninstitutionalized population as reported by the U.S. Census. *Source*: Authors' tabulations based on NHIS data tapes. A,B. *Legend*: ■—■, any limitation; ◇—◇, major activity limitation; ×—×, work limitation; ▲—▲, unable to perform major activity; ●—●, unable to work.

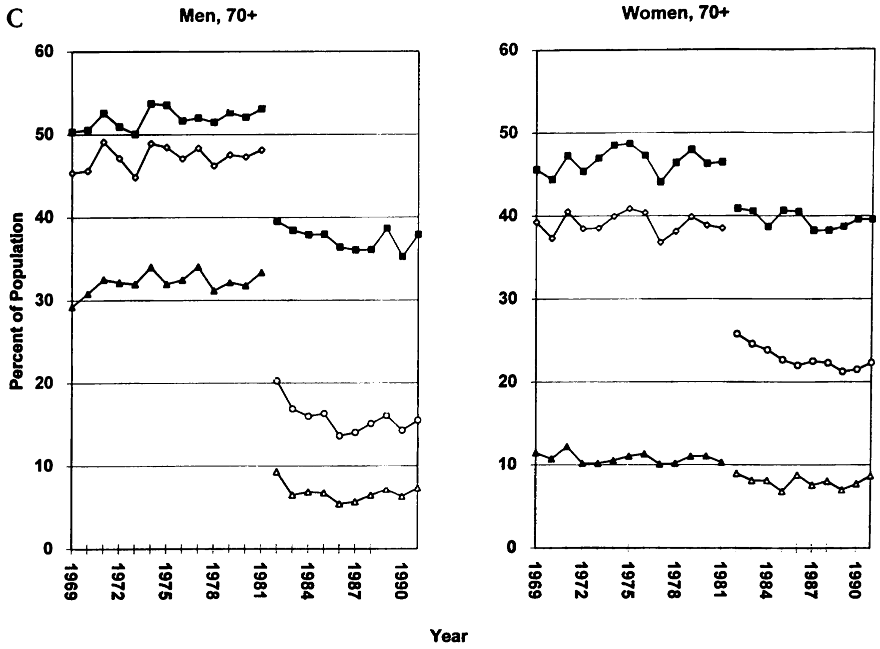

FIG. 1. *continued*. C. ■—■, any limitation; ◇—◇, major activity limitation; ▲—▲, unable to perform major activity; ○—○, IADL limitation; △—△, ADL limitation.

1980s. The jump that occurs between 1981 and 1982 is presumably a consequence of the change in the nature of the questions asked of those 70 years of age and older. The figures for 1982 are probably somewhat inflated because of a mistake made in the administration of the survey: those 70 years old were asked activity limitations questions appropriate for younger individuals (Kovar and Poe 1985).

Trends in activity limitations derived from the NHIS are consistent with those available from other sources. Since 1970, the decennial census of the population has included questions asking whether each household member has "a health or physical condition which limits the kind or amount of work he can do." Table 1 shows the fraction of men and women aged 45 to 64 who were identified in the census as either limited in their capacity for work or unable to work altogether. For both men and women, the census data show increases in the fraction identified as unable to work during the 1970s and moderate declines since then. In addition, Wolfe and Haveman (1990) have constructed measures of the

TABLE 1
Work Limitations for Persons Aged 45 to 64 Years, by Sex and Year

Year	Men (%)[b]		Women (%)[b]	
	Limited	Unable	Limited	Unable
1970[a]	17.87	6.52	16.19	9.18
1980	17.82	9.74	16.27	11.11
1990	16.00	9.07	14.42	9.62

[a] Data from 1970 have been recoded to be consistent with data from 1980 and 1990.
[b] All percentages are age standardized.
Source: Authors' calculations using the Census PUMS 1% sample for 1970 and the Census PUMS 5% sample for 1980 and 1990.

prevalence of work disability based on information available in the Current Population Survey. They find increases in work-related disability during the 1970s and declines during the 1980s. Finally Manton, Corder, and Stallard (1993), using the National Long-Term Care Survey, have reported declines in the prevalence of instrumental activities of daily living (IADLs) during the 1980s in the population 65 years old or above.

General Health Status

Since 1972, the NHIS has asked individuals to rate their overall health. Before 1982 the survey asked individuals to rate their health as excellent, good, fair, or poor compared with the health of other individuals of the same age. Since 1982, the question has directed individuals to rate their health as excellent, very good, good, fair, or poor, without comparison to the health of others.

Figure 2 presents trends in the fraction reporting themselves in fair or poor health, by age and sex. For each group, this proportion stayed relatively constant during the 1970s and fell significantly during the 1980s.

Chronic Conditions

The NHIS asks individuals if they have a variety of chronic conditions. Using these reports, we computed prevalence estimates for several of these conditions. Table 2 reports trends in the self-reported prevalence

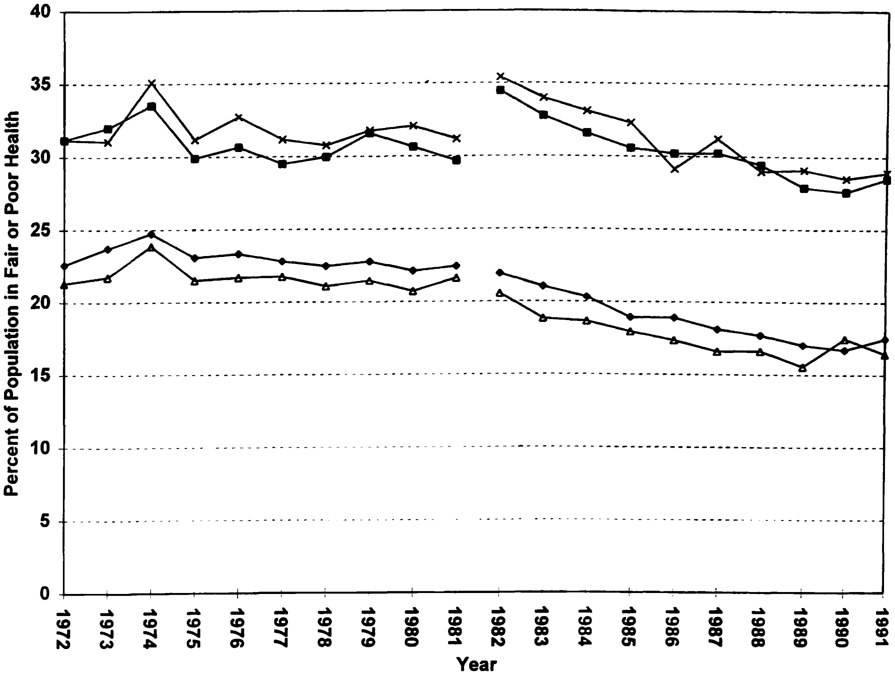

FIG. 2. Trends in self-reported health status from 1972 to 1991. All percentages are directly standardized to the 1980 age distribution of the noninstitutionalized population as reported by the U.S. Census. *Source*: Authors' tabulations based on NHIS data tapes. *Legend*: ×—×, men aged 65+; ■—■, women aged 65+; △—△, men aged 45 to 64; ◆—◆, women aged 45 to 64.

of selected chronic conditions. Before 1978, the survey collected information on only one of six sets of conditions per year. The prevalence rates we report for this period are therefore from different years between 1969 and 1973. As of 1978, the survey gathered information on each of the six sets of conditions every year, but any given household was only asked one of the six sets. Using data tapes from the 1969–73 surveys individually and pooling the data files from 1979 to 1981, we estimate prevalence rates for several conditions. Using these rates, we calculate both average annual changes and average annual growth rates during the 1970s. To give some indication of the reliability of the estimated trends, we also report *t*-statistics for the test that there is no trend.

For the 1982–91 period we calculate prevalence estimates annually. These single-year measures are inexact owing to the relatively small sample sizes involved. Rather than use the single-year measures at the end points of this period, we estimated regressions of the natural log of the annual prevalence rates on a linear time trend. This technique efficiently uses information for each of the 10 years between 1982 and 1991. The estimated prevalence rates reported for 1982 and 1991 in table 2 represent predicted values from these regressions, whereas the reported growth rate represents the coefficient on the time trend. We also report the *t*-statistic on this regression coefficient.

For many of the conditions presented here, self-reported prevalence rates grew significantly during the 1970s for all age and sex groups. The largest increases tend to be found in cardiovascular conditions, especially hypertension and arteriosclerosis. In contrast, the prevalence of impairments and deformities generally decreased during the 1970s. Like trends in the other health measures reported above, however, patterns in self-reported chronic conditions are markedly different in the 1970s and 1980s. In contrast to the large increases in self-reported prevalence of chronic conditions observed during in the 1970s, we find very little increase (and some decrease) in the 1980s. For example, among men aged 45 to 64, hypertension had an average annual growth rate of 9.8 percent in the 1970s, and then a small but statistically insignificant decrease in the 1980s. Similarly, self-reported prevalence of arthritis rose significantly during the 1970s for this group but fell slightly during the 1980s. Heart conditions, which grew by an average of 3.4 percent per year in the 1970s among middle-aged men, declined by an average of 0.8 percent per year through the 1980s. Among women in this age range, trends in hypertension and heart conditions mirror those among men; in addition, decreases in self-reported prevalence of arthritis among women in the 1980s are statistically significant and of similar magnitude to the increases observed during the 1970s.

Among men over 65, trends in arthritis, heart disease, and hypertension also mirror those among younger men. Interestingly, for this group the condition with the largest increase in the 1970s (arteriosclerosis) is also the condition with the largest decrease in the 1980s. Other conditions with relatively high levels of prevalence show either no significant trend in either period (e.g., hearing impairments) or declines in both (e.g., visual impairments). Among older women, trends are again parallel to those for men, with heart conditions, arteriosclerosis, and hypertension rising in the 1970s and falling in the 1980s (although the decline is statistically significant only for arteriosclerosis); arthritis rises during the 1970s and shows a statistically insignificant decrease in the 1980s. As

TABLE 2
Trends in Self-Reported Prevalence Rates for Selected Chronic Conditions

	1970s					1980s				
			Annual					Annual		
Condition	1969–73[a]	1979–81[a]	Change	% Change	*T*-stat	1982[a]	1991[a]	Change	% Change	*T*-stat
Men 45–64										
Endocrine										
Diabetes	41.6	54.0	1.8	3.7	2.8	53.9	60.1	0.7	1.2	1.0
Circulatory										
Heart conditions	100.2	131.4	3.9	3.4	4.8	155.4	144.9	−1.2	−0.8	1.1
Arteriosclerosis	4.5	26.6	2.8	22.2	9.1	31.9	15.1	−1.9	−8.3	3.0
Hypertension	103.0	225.0	15.3	9.8	16.6	244.6	239.4	−0.6	−0.2	0.4
Stroke	13.4	16.3	0.4	2.5	1.2	19.9	16.8	−0.3	−1.8	1.0
Musculoskeletal										
Arthritis	152.6	201.9	4.5	2.5	6.3	211.6	203.5	−0.9	−0.4	1.2
Bursitis	38.3	47.3	0.8	1.9	2.2	42.2	32.5	−1.1	−2.9	2.0
Respiratory										
Bronchitis	32.4	32.2	0.0	−0.1	0.1	34.5	39.0	0.5	1.4	1.1
Emphysema	23.4	34.7	1.1	3.9	3.3	34.1	18.0	−1.8	−7.1	5.1
Asthma	30.1	26.4	−0.4	−1.3	1.0	28.6	31.5	0.3	1.1	0.7
Impairments										
Visual	74.6	69.4	−0.6	−0.8	1.0	64.4	56.7	−0.9	−1.4	1.4
Hearing	143.5	159.4	1.8	1.2	2.2	194.2	186.4	−0.9	−0.5	0.6
Back or spine	68.9	77.2	0.9	1.3	1.6	—	—	—	—	—
Lower extremities	50.9	39.2	−1.3	−2.9	2.6	—	—	—	—	—
Back or extremities						173.8	193.9	2.2	1.2	1.4
Paralysis	12.4	11.3	−0.1	−1.0	0.5	10.9	9.9	−0.1	−1.2	0.5

Women 45–64										
Endocrine										
Diabetes	45.5	58.0	1.8	3.7	2.9	58.3	53.6	−0.5	−0.9	1.3
Circulatory										
Heart conditions	83.0	120.2	4.6	5.1	6.5	117.5	110.2	−0.8	−0.7	0.9
Arteriosclerosis	3.9	15.3	1.4	17.4	6.4	13.9	9.5	−0.5	−4.2	1.9
Hypertension	153.0	249.5	12.1	7.6	12.6	278.0	239.5	−4.3	−1.7	2.9
Stroke	10.7	12.9	0.3	2.4	1.1	13.0	18.3	0.6	3.8	1.8
Musculoskeletal										
Arthritis	262.7	306.2	4.0	1.9	4.9	352.7	298.1	−6.1	−1.9	4.7
Bursitis	41.9	59.1	1.6	3.3	4.1	51.9	41.9	−1.1	−2.4	1.7
Respiratory										
Bronchitis	46.4	45.4	−0.1	−0.2	0.2	56.1	74.9	2.1	3.2	2.1
Emphysema	6.7	10.7	0.4	4.8	2.3	12.3	9.3	−0.3	−3.2	1.4
Asthma	37.1	37.7	0.1	0.2	0.2	35.8	47.3	1.3	3.1	2.1
Impairments										
Visual	54.6	39.1	−1.7	−3.9	3.6	35.7	30.7	−0.6	−1.7	1.1
Hearing	92.9	103.0	1.1	1.3	1.7	98.2	101.8	0.4	0.4	0.4
Back or spine	68.9	78.7	1.1	1.6	1.9	—	—	—	—	—
Lower extremities	47.1	30.4	−1.8	−5.0	4.2	—	—	—	—	—
Back or extremities						157.8	181.8	2.7	1.6	2.7
Paralysis	9.7	5.6	−0.5	−6.1	2.2	7.9	5.8	−0.2	−3.5	0.6

continued

TABLE 2
Continued

	1970s					1980s				
			Annual					Annual		
Condition	1969–73[a]	1979–81[a]	Change	% Change	*T*-stat	1982[a]	1991[a]	Change	% Change	*T*-stat
Men 65+										
Endocrine										
Diabetes	60.5	82.8	3.2	4.8	2.8	85.5	96.3	1.2	1.3	0.9
Circulatory										
Heart conditions	198.8	275.8	9.6	5.4	6.0	305.3	310.9	0.6	0.2	0.3
Arteriosclerosis	29.5	107.6	9.8	17.2	10.6	90.5	48.5	−4.7	−6.9	4.6
Hypertension	141.6	297.6	19.5	11.8	12.7	332.8	301.0	−3.5	−1.1	2.4
Stroke	53.8	53.1	−0.1	−0.2	0.1	63.6	66.5	0.3	0.5	0.3
Musculoskeletal										
Arthritis	286.5	364.5	7.1	3.2	5.4	388.0	374.1	−1.5	−0.4	0.9
Bursitis	25.6	22.5	−0.3	−1.2	0.6	29.7	34.0	0.5	1.5	0.6
Respiratory										
Bronchitis	48.7	40.3	−0.8	−2.0	1.3	47.4	54.5	0.8	1.6	1.1
Emphysema	59.1	79.3	2.0	3.2	2.5	73.0	56.4	−1.8	−2.9	2.1
Asthma	42.4	29.9	−1.2	−3.6	2.0	39.5	35.0	−0.5	−1.3	0.6
Impairments										
Visual	180.3	133.4	−5.2	−4.0	4.1	111.0	87.8	−2.6	−2.6	2.1
Hearing	334.7	323.2	−1.3	−0.6	0.8	356.6	365.9	1.0	0.3	0.6
Back or spine	54.4	72.0	1.9	3.3	2.4	—	—	—	—	—
Lower extremities	64.9	51.2	−1.5	−2.8	1.8	—	—	—	—	—
Back or extremities						164.5	173.2	1.0	0.6	0.7
Paralysis	27.3	22.5	−0.5	−2.2	1.0	23.3	20.9	−0.3	−1.2	0.4

Women 65+									
Endocrine									
Diabetes	91.0	88.8	−0.3	−0.4	0.3	95.7	97.3	0.2	0.2	0.2
Circulatory										
Heart conditions	198.4	271.3	9.1	5.1	6.7	278.5	273.0	−0.6	−0.2	0.3
Arteriosclerosis	23.1	101.4	9.8	19.6	12.9	85.7	40.3	−5.0	−8.4	7.2
Hypertension	240.5	432.4	24.0	11.0	15.7	449.3	419.7	−3.3	−0.8	1.9
Stroke	44.0	41.1	−0.4	−0.9	0.5	52.1	54.0	0.2	0.4	0.3
Musculoskeletal										
Arthritis	451.1	524.0	6.6	2.7	5.5	550.8	547.1	−0.4	−0.1	0.3
Bursitis	30.6	43.4	1.2	3.3	2.6	44.7	40.0	−0.5	−1.2	0.9
Respiratory										
Bronchitis	40.1	55.8	1.6	3.5	2.8	67.8	69.2	0.2	0.2	0.1
Emphysema	11.8	23.5	1.2	7.0	3.4	21.1	23.7	0.3	1.3	0.6
Asthma	31.2	24.8	−0.6	−2.3	1.4	39.0	45.1	0.7	1.6	0.8
Impairments										
Visual	221.6	121.2	−11.2	−8.1	9.6	94.1	64.9	−3.3	−4.1	5.7
Hearing	263.4	255.1	−0.9	−0.5	0.7	260.7	260.4	0.0	0.0	0.0
Back or spine	76.2	85.8	1.1	1.4	1.3	—	—	—	—	—
Lower extremities	90.5	54.2	−4.0	−6.1	5.1	—	—	—	—	—
Back or extremities						205.8	217.3	1.3	0.6	0.6
Paralysis	19.8	19.2	−0.1	−0.4	0.2	17.0	13.4	−0.4	−2.6	0.7

[a] Per 1,000.

Notes: The 1969–73 (musculoskeletal, 1969; respiratory, 1970; impairments, 1971; circulatory, 1972; endocrine, 1973) and 1979–81 numbers are actual (age-standardized) prevalence estimates, whereas the 1982–91 figures were derived from regressions using all years between 1982 and 1991. The figures for 1982 and 1991 represent predicted values from a regression of the ln (rate) on a linear time trend, whereas the annual growth rate represents the coefficient on the time trend from this regression. *T*-statistics account for complex sample design.

Source: Authors' tabulations based on NHIS data tapes.

among men, visual impairments fall significantly in both periods while hearing impairments show no significant direction.

Taken together, the data we have presented from the NHIS suggest that the health of the middle aged and elderly was deteriorating during the 1970s, but improving during the 1980s. However, NCHS researchers have warned that changes in the population covered by the NHIS, in the nature of the questions asked, and in the implementation of the survey could all affect estimated trends. Although each of these changes will have had some impact on the patterns we report, it is hard to imagine that they can account for the bulk of the observed change.

First, because the NHIS samples the civilian noninstitutionalized population, one might wonder whether changes in the fraction of the population institutionalized have a major effect on the composition of the population sampled by the survey. For those aged 45 to 64, the deinstitutionalization of the mentally ill meant that institutionalization rates decreased during the 1970s and may have added to the population in poor health and suffering activity limitations. However, the drop in institutionalization rates from 0.9 to 0.7 percent (U.S. Bureau of the Census 1973, 1984) was too small to account for much of the observed increase in activity limitation. For those aged 65 and older, institutionalization rates actually increased slightly over the 1970s and 1980s (U.S. Bureau of the Census 1973, 1984, 1992), but again, the magnitude of these changes was inconsequential.

Second, various changes in the NHIS questionnaire during the study period may well influence the measures we report. As we have noted, the NHIS underwent a major redesign in 1982. Figures 1 and 2 indicate that this redesign clearly influenced both the fraction of the population reporting activity limitation and the fraction identifying themselves as in poor health, and for this reason we analyze the 1970s and 1980s separately. However, the change in the nature of some of the questions might have affected not just the levels but also the trends in some health measures. For example, the 1982 changes, which affected the general health question asked of all respondents, and the activity limitation questions, asked of respondents 70 years old and over, might pick up different trends than were captured by the questions asked prior to the redesign of the survey. The nearly universal nature of the trend shifts, however, would seem to belie any such simple explanation for them.

In terms of the way the NHIS has been administered, one specific change has been in the use of proxy respondents. NCHS has made an effort to reduce the rate of proxy response in the NHIS. Available data suggest that proxy respondents are less likely to report an individual as disabled (limited in his or her activity), less likely to report restricted activity days (Kovar and Wright 1973), and less likely to report the presence of chronic conditions. However, the changes in the fraction self-reporting in the NHIS are simply not large enough to make much of a difference. For example, between 1970 and 1980, the fraction of men 45 to 64 years of age self-reporting rose from 43 to 49 percent, whereas the fraction of older men and of women hardly changed at all.

Finally, we note that the trends in activity limitation found in the NHIS are consistent with comparisons based on the 1970, 1980, and 1990 U.S. census. In sum, it seems unlikely that observed trends in self-reported health can be accounted for by modifications in either the design of the NHIS or in the way it was administered.

The Size of the Mortality Decline

The "failure of success" hypothesis is based on the notion that declining mortality at older ages will increase the average frailty of the elderly population, as people who would have died in previous generations spend their extra years in ill health (either because they are saved from death, but not from disease, or because they live on to contract a different disease) (Gruenberg 1977; Verbrugge 1984). It is possible to calculate a plausible upper bound on the magnitude of this effect by calculating the fraction of the older population alive today that would have been dead had they faced earlier cohorts' survival probabilities. We refer to this fraction of the population as "marginal survivors."

We use data from the U.S. vital statistics and standard life table methods (U.S. Bureau of the Census et al. 1975) to calculate an estimate of this upper bound. We calculate the fraction of the population over the age of 45 in 1970, 1980, and 1988 who, if they had reached the age of 45, would not have been alive had they faced the mortality schedules of those born 10 years earlier (8 years in the case of 1988). We focus on people who would have reached the age of 45 to highlight changes for the elderly.

To determine the fraction of the population who are marginal survivors, we first define the survival ratio to age x for a member of the cohort born in year w as

$$S^{w}(x) \equiv \frac{l_x^w}{l_{x-10}^w} = \prod_{t=x-10}^{x-1} (1 - q_t^w),$$

which is the actual probability of survival to *exact* age x conditional on survival to exact age $x - 10$ or age 45, whichever is larger. The life table death rate, q_t, is defined as the probability that an individual dies between birthdays t and $t + 1$, and l_x is the number surviving (out of l_{x-10}) to their xth birthday. The data we use to calculate mortality rates are found in the volumes for 1950 through 1988 of *Vital Statistics of the United States* (National Center for Health Statistics 1952–90) and various volumes of the P-25 series of *Current Population Reports* (U.S. Bureau of the Census, various years). The methods we use are described in detail by Shryock and Siegel (U.S. Bureau of the Census et al. 1975). Using these mortality rates, we then construct cohort life tables for every cohort that reached age 45 between 1950 and 1988.

Next we define a hypothetical survival ratio, $HS^{w,w-s}(x)$. Suppose those aged x years in year r had experienced their own mortality schedule until $r - s$, but between $r - s$ and r experienced the schedule of a cohort born s years before them. Symbolically,

$$HS^{w,w-s}(x) \equiv \begin{cases} \prod_{t=45}^{x-s-1} (1 - q_t^w) \prod_{t=x-s}^{x-1} (1 - q_t^{w-s}) & \text{if } x - s > 45; \\ S^{w-s} & \text{otherwise.} \end{cases}$$

Finally, we define marginal survival as

$$MS^{w,w-s}(x) \equiv \frac{S - HS}{S}.$$

These ratios are defined in terms of single-year exact ages. To calculate multiple-age survival ratios (i.e., the fraction of the population aged 45 to 64 in a given year who would have been dead had they faced death rates of the cohorts born 10 years earlier), we weight the single-year survival ratios by single-year population estimates (Ps) from s years before. For example, the hypothetical survival ratio for 64-year-olds in 1980 is weighted by the size of the 54-year-old population in 1970. Marginal survival ratios are then calculated, substituting our multiple-year ratios for the single-year S and HS terms above. We calculate these ratios for both men and women for the age groups 45 to 64 and 65 and above (actually 65 to 104).

We also obtain estimates of the relative contributions of declines in specific causes of death to general mortality decline. We calculate (for each year) the fraction of deaths at every age due to each of 17 broad categories of conditions defined by the International Classification of Diseases. The hypothetical survival ratios used for these calculations are obtained by substituting, for individual causes, the death rates from cohorts born 10 years earlier while leaving mortality rates from all other causes unaltered, assuming cause-specific mortality rates to be in the same relative proportions as deaths, by cause. Implicit in this calculation is the common simplifying assumption of independence of risks among all causes of death. For probabilities as small as those involved in the younger age group, this assumption is not terribly distorting. In the older group, when the probability of death greatly increases, this assumption may be more of a problem, but the results should be informative, nonetheless.

Under the assumptions that all "marginal" survivors were limited or ill, and that prevalence rates of poor health remained constant for the remainder of the population, the fraction of the population who are "marginal survivors" represents the net addition to the chronically ill population. This exercise presumably overestimates the impact of declining mortality on health for two reasons: First, not all of the "marginal" survivors would have been in poor health. Second, it seems likely that, even in the absence of mortality improvements, there would have been health improvements among the inframarginal survivors.

Table 3 shows the results of our calculations of the changes in survivorship in the 1960s, 1970s, and 1980s. The entries in the table represent the percentage of the population at the end of the period who were alive because of decreased mortality during the period. For instance, in 1980, 1.355 percent of men aged 45 to 64 were alive owing to decreases in mortality rates between 1970 and 1980. Younger men exhibited large improvements in survivorship during the 1970s and 1980s relative to the 1960s, while younger cohorts of women experienced steady increases in survivorship in all three decades. Not surprisingly, mortality declines affect a much larger fraction of men and women aged 65 and over. Older women experienced improvements in mortality conditions in all three decades, whereas improvements for men began in the 1970s; for men and women 65 and over, mortality improvements were largest in the 1970s.

Examining mortality changes by disease category, we see that mortality improvements for both men and women in the 1970s and 1980s were

TABLE 3
Increased Survivorship

Cause of death	Ages 45-64			Ages 65+		
	1960-70	1970-80	1980-88	1960-70	1970-80	1980-88
Men						
All causes	0.177	1.355	1.228	−0.451	5.103	3.835
Diseases of circulatory system	0.277	1.074	0.860	0.710	5.361	4.473
Neoplasms	−0.148	−0.094	0.021	−0.915	−1.058	−0.445
Diseases of respiratory system	−0.098	0.086	0.059	−1.213	−0.233	−0.262
Women						
All causes	0.506	0.610	0.456	3.602	6.157	1.751
Diseases of circulatory system	0.475	0.489	0.273	2.755	5.590	3.248
Neoplasms	0.074	−0.014	0.025	0.367	−0.146	−0.528
Diseases of respiratory system	−0.042	−0.013	−0.007	−0.151	0.070	−0.545

Notes: Numbers represent the percent of the population alive at the end of the period who would have been dead if, during the period, they had faced the age/cause-specific mortality rates of the cohort born 10 years (8 years for 1988) earlier.
Source: Based on calculations using U.S. vital statistics data.

primarily due to declining mortality from diseases of the circulatory system. Among older men, neoplasms and respiratory conditions seemed to exhibit increased mortality in each decade, although this may be a phenomenon of competing risk (i.e., those not dying from circulatory conditions were living, only to contract and die from respiratory conditions and cancer). Alternatively, patterns of smoking behavior might have been responsible for increased mortality from these causes; cohort trends in smoking patterns appear consistent with observed increases in respiratory and cancer mortality among both men and women (Harris 1983).

The Failure of the "Failure of Success"

The trends in self-reported health and mortality are not consistent with the patterns we would expect if improved mortality conditions had led to increased frailty of the population over the age of 45, as the "failure of success" hypothesis suggests. This inconsistency is apparent in several places. First, mortality rates among the older population declined during both the 1970s and 1980s. However, our tabulations suggest that self-reported health trends in the 1980s were much different from those in the 1970s. Whereas the 1970s saw increases in the prevalence of self-reported limitations and chronic conditions among most age and sex groups, trends in most of these measures leveled off or began to decline in the 1980s. If the apparent deterioration in health status in the 1970s was a result of a lengthening life span, then we could plausibly expect further deterioration in the 1980s.

Second, the largest improvements in mortality during the 1970s appear among older cohorts. As seen in table 3, the fraction of the male population over the age of 65 in 1980 resulting from increased survivorship is nearly four times the fraction of those aged 45 to 64. For women, excess survivorship among older cohorts is more than 10 times as large as among the younger group. However, the deterioration of self-reported health among the younger cohorts during the 1970s is as large as, or larger than, the decline in the health reported by older cohorts. If declines in mortality were causing the apparent increased frailty of the population over the age of 45, we would expect much larger deterioration among those over the age of 65 relative to those who were 45 to 64 years old.

Third, for both age and sex groups—but especially for respondents under age 65—the magnitude of the changes in self-reported health status in the 1970s is larger than could plausibly be explained by mortality declines. Self-reported activity limitations (any limitation) increased by 3.3 percentage points during the 1970s for younger men and by 3.9 percentage points for younger women (fig. 1A). At most, changing mortality might account for a 1.4 percentage point increase for these men and a 0.6 percentage point increase for these women (table 3).

Similarly, mortality trends are not large enough to explain the rise in the prevalence of chronic conditions. For example, we calculated that 1.1 percent of the 45- to 64-year-old men alive in 1980 would have died from diseases of the circulatory system a decade earlier. This 1 percent decrease in mortality compares with an increase of 3.1 percentage points between 1972 and 1980 in the number of such men identifying themselves as suffering from heart conditions. Similarly, 5.6 percent of women who were 65+ years old in 1980 would have died from diseases of the circulatory system a decade earlier, while the prevalence of heart conditions rose 7.3 percentage points, arteriosclerosis rose 7.8 points, and hypertension rose 19.1 points among these women during the 1970s. Differences among men were roughly similar to those observed for women, in both age groups.

Fourth, the fact that much of the increased survivorship is due to lower risk of death from cardiovascular causes supports the notion that many of the marginal survivors are able-bodied. Others have estimated that more than half of the decline in ischemic heart disease mortality (the largest single component of circulatory system mortality) in the 1960s and 1970s can be attributed to lifestyle changes, including reduced cigarette smoking, weight reduction, and lower serum cholesterol levels (Goldman and Cook 1984; McBride 1992). Correspondingly, less than half of the decline in cardiovascular disease mortality could be attributed to medical interventions, including both the better treatment of chronic heart trouble (e.g., improved control of hypertension) and the increased success of emergency medical intervention. It seems natural to imagine that many of these marginal survivors would be able bodied. Further, although it is *possible* that the cardiovascular health of the population that would have survived anyway was deteriorating, it would seem likely that both the lifestyle changes and the better treatment of chronic heart trouble could be expected to *improve* the health of many who would have been alive regardless. All in all, it seems doubtful that decreased cardiovascular mortality could account for much of the trends in self-reported health measures.

Together, these inconsistencies cast serious doubt on the idea that observed trends in self-reported health are due to declines in mortality. An alternative explanation for the observed trends in self-reported health emphasizes a combination of two forces: first, a changing social and economic environment brought about by the expansion of income maintenance programs for individuals in poor health, and second, the earlier diagnosis of preexisting conditions.

Social and Economic Forces and Self-Reported Activity Limitation

During the 1960s and early 1970s, the availability of public income maintenance for the disabled increased dramatically. The largest of such programs, Social Security Disability Insurance (SSDI), started in 1957 as a narrowly targeted program, providing benefits to workers aged 50 to 64 who suffered permanent disability. In 1960, SSDI expanded to cover workers under the age of 50, and in 1965 workers with temporary, as well as permanent, disability became eligible. In 1974, the Supplemental Security Income program (SSI) was established, covering the low-income disabled without a sufficient work history to qualify for SSDI (U.S. Senate 1982).

From 1965 until the mid-1970s, SSDI benefits rose while eligibility requirements became more liberal. As a result, the number and fraction of adults receiving SSDI rose over this period, from 1.2 percent in 1965 to 2.5 percent in 1978. Starting in 1976, however, the Social Security Administration and Congress worked to tighten eligibility requirements. By 1983, the fraction of adults receiving SSDI had fallen to 2.1 percent and has stayed relatively constant since then (U.S. Senate 1982; National Center for Health Statistics 1990).

It seems plausible that the availability of disability insurance affects the way workers in poor health view their health and consequently has an impact on trends in self-reported health. In the absence of disability insurance, people who identify themselves as physically limited may, nevertheless, work. When public assistance is available these same people may leave the labor force and identify themselves as physically unable to work. In this case, observed increases in self-reported prevalence of activity limitations during the 1970s (fig. 1) reflect, in part, changing labor force behavior of workers in poor health made possible by the growth in the availability and generosity of disability insurance programs during this period.

For men 45 to 64 years old, there is a striking congruence between changes in the fraction receiving SSDI benefits and the fraction who identify themselves as suffering activity limitations. As of 1970, 4.5 percent of men aged 45 to 64 years were receiving SSDI benefits. This number rose to 7.4 percent in 1980, then fell to 6.2 percent in 1989. The 2.9 percentage point increase and the 1.2 point decrease mirror closely the roughly 3 percentage point increase and 0.5 to 1.0 percentage point drop in the fraction of men identified as unable to work that occurred over the same time period. For women, partly because of the work-history requirement for receiving SSDI, it is also important to take account of other sources of transfer income. When we include SSI, the changes in the fraction receiving disability income closely match the changes in the fraction reporting that they are limited in their ability to perform their major activity (see Appendix).

Furthermore, the most dramatic changes in the fraction of individuals reporting activity limitations occur for those under the age of 65—those who are eligible for disability programs. Indeed, for men and women aged 70 and over, who were presumably unaffected by changes in SSDI and SSI, levels of activity limitation remained effectively unchanged throughout the study period. If trends in activity limitations reflected mortality declines, we would expect to see these age patterns reversed because mortality declines were greatest for those over 65.

In addition, among men reporting any activity limitation, the fraction reporting that they were "unable to work" rose. For example, in 1969, 36 percent of men aged 45 to 64 years reporting any limitation stated that they were unable to perform their major activity; in 1981, this had risen to 46 percent. Similarly, the probability that a man identifying himself as suffering from one of the major potentially disabling chronic conditions would also identify himself as "unable to work" also rose. Thus, for example, we calculated from the NHIS that in 1972, among men suffering from any one of the chronic circulatory conditions listed in table 2, 19.4 percent reported themselves as unable to work. By 1980 this had risen to 30.3 percent. These findings are also consistent with our hypothesis about disability programs, which suggests that individuals with a given health problem may identify themselves as "limited" if they are working and "unable" if they are not.

Finally, while the fraction of men identified as limited in their ability to work rose during the 1970s, the fraction identifying themselves as in fair or poor health—a measure that is plausibly less sensitive to labor force status—remained relatively stable (fig. 2).

The systematic way in which self-reported activity limitations vary with the availability of disability programs suggests that changing labor force behavior is an important factor in these trends. Men or women who would have worked, had they lived in earlier periods, are now out of the labor force, identifying themselves as disabled and receiving disability benefits.

Nevertheless, we do not intend to imply that SSDI or SSI recipients are "malingerers." Ample evidence suggests that the vast majority of those who apply for disability benefits suffer from serious health problems that affect their capacity for work (Bound 1989; Nagi 1969). However, even an individual suffering from serious health problems may continue to work if he or she has no other source of support.

We also stress that our findings do not imply that the increased availability of disability income was the sole cause of changing labor force behavior. In particular, other labor market trends, including declining demand for older workers and changing attitudes about work among older workers, might have had a disproportionate impact on those in relatively poor health, leading them to leave the workforce (Bound and Waidmann 1992; Berkowitz, Johnson, and Murphy 1976; Levitan and Taggart 1977). Regardless, however, of whether increases in the availability of disability insurance induced some in poor health to leave the labor force, or whether declining job opportunities encouraged those in poor health to leave the workforce and apply for benefits, it seems plausible that such individuals would end up identifying themselves as unable to work.

Early Diagnosis and Trends in Self-Reported Chronic Conditions

Although we conclude that increases in the fraction of the population reporting activity limitations of some kind reflect changes in the labor force behavior of individuals with health limitations, we suspect that the earlier diagnosis of preexisting health conditions is important for explaining the growth in the number of individuals reporting chronic conditions. We hypothesize that earlier diagnosis was the consequence of increased awareness of the importance of early detection and possibly the increased availability of medical care for some segments of the population, particularly through Medicare and Medicaid.

The most direct evidence of earlier diagnosis relates to the prevalence of hypertension. The National Health and Nutrition Examination Surveys, conducted in 1971–75 (NHANES I) and 1976–80 (NHANES II), contain clinical findings (results from a physician's examination and several diagnostic tests) together with a medical history on a random sample of the population. These data allow us to compute prevalence rates for some conditions based on the results of the physician's diagnosis rather than on the basis of self-reports alone. Because there may be inconsistencies between physician reports within a given survey and between surveys, results from diagnostic tests are more useful for calculating prevalence rates and comparing them over time. Although the two NHANES contain several diagnostic tests, only EKGs and blood pressure readings are directly comparable across the two surveys, and only blood pressure readings were publicly available at the time of this writing.

In both NHANES I and NHANES II, three blood pressure readings were taken, and we base our analysis on the average of the three. Our clinical measure of hypertension prevalence represents individuals whose average systolic blood pressure reading is at or above 140 mm Hg and/or who report currently taking antihypertension medicine. In restricting our attention to the systolic readings rather than using the standard definition of hypertension (systolic pressure ≥ 140 *or* diastolic ≥ 90), we follow procedures used by the National Center for Health Statistics when comparing hypertension prevalence rates across NHANES surveys. The argument for this procedure is based on the greater reliability of systolic blood pressure readings (Drizd, Dannenberg, and Engel 1986). We note, however, that results based on the standard definition did not differ substantively from those reported here. Our self-reported measure of hypertension represents individuals who said that a doctor had told them they were hypertensive and/or who were currently taking hypertension medicine. Virtually all of those who reported taking antihypertension medicine also reported a history of hypertension. Finally, we combine data on clinical and self-reported prevalence to calculate the "percent diagnosed": the proportion of clinical cases who identified themselves as hypertensive and/or were currently taking medicine.

Table 4 shows that clinically measured prevalence rates drop between NHANES I and NHANES II while self-reported prevalence rates show both qualitatively and statistically significant increases; trends in self-reported prevalence from the NHANES are generally similar to those observed from the NHIS (table 2). The results in table 4 thus suggest that the actual prevalence of hypertension did not rise during the mid-1970s. Instead, the NHANES data suggest that observed increases in self-reported prevalence were largely due to significant increases in the rate of clinical diagnosis: for both men and women, the increase in "percent diagnosed" was at least as large as the increase in self-reported hypertension. Clinical data from the Minnesota Heart Survey and the Impact of Hypertension Information survey show similar trends (Folsom et al.

TABLE 4

Hypertension Prevalence among 45- to 74-Year-Olds Based on NHANES Data

Condition	NHANES I[a]	NHANES II[a]	Change	Percent change	*T*-stat
Men					
Systolic blood pressure > 140 or medicine use	493.1	446.9	−46.2	−9.4	−2.3
Self-reported hypertension	263.4	331.1	67.7	25.7	4.6
Percent diagnosed	42.29	57.88	15.59	36.9	5.9
Sample size	1,962	3,112			
Women					
Systolic blood pressure > 140 or medicine use	525.8	484.8	−41	−7.8	−2.4
Self-reported hypertension	349.8	416.8	67	19.2	4.4
Percent diagnosed	56.08	70.01	13.93	24.8	5.5
Sample size	2,149	3,499			

[a] Per 1,000.

Notes: Blood pressures represent the average of three readings. In the few cases where one or two readings were missing, the blood pressures were averaged across the available readings. A person was coded as reporting that he or she suffered from hypertension if the person reported having been told that he/she had hypertension or high blood pressure by a physician or if he/she reported taking medicine to control hypertension. Prevalence estimates are age standardized, and *t*-statistics are calculated taking into account sample design effects.

Source: Authors' tabulations based on the NHANES-I and NHANES-II data tapes.

1983; Apostolidies et al. 1980). A combination of factors may be responsible for the earlier diagnosis of preexisting conditions. For heart conditions, control and prevention began to receive increased attention starting in the 1960s (Stamler 1981). In 1960, the American Medical Association issued its first statement on the relation between smoking and heart disease, and in 1961 it issued its first statement on the relation between diet and heart disease. In 1970 the Inter-Society Commission for Heart Disease Resources published the *Report on the Primary Prevention of Atherosclerotic Diseases*, followed in 1971 by similar reports from the White House Conference on Nutrition and the Task Force on Arteriosclerosis of the National Heart and Lung Institute. Spurred in part by the Veterans Administration Cooperative Study of the Effectiveness of Antihypertensive Drugs (Veterans Administration Cooperative Study Group on Antihypertensive Agents 1967, 1970), the Department of Health, Education and Welfare began the National High Blood Pressure Education Program in 1973.

Evidence of the success of these efforts is varied. Data from the National Disease and Therapeutic Index indicate that physician visits for diagnosis and treatment of hypertension and hypertensive heart disease increased nearly 60 percent from 1970 to 1976 (Roccella and Ward 1984). The NHIS supplementary surveys on use of preventive care procedures, conducted in 1973 and 1982, show increased utilization of electrocardiograms during this period; whereas the 1973 survey neglected to ask about blood pressure screening, the 1982 survey indicated that fully 75 percent of the population had been given a blood pressure test within the previous year, rising to 77.2 percent of those aged 45 to 64 and 82.5 percent of those aged 65 to 74 (U.S. Health Resources Administration 1977; National Center for Health Statistics 1986). Both clinical evidence and survey data show that average blood pressure and cholesterol levels have fallen since the 1960s, as have per capita consumption of tobacco, cream, butter, eggs, and animal fat (Harris 1983; Stamler 1981; Harlan 1989; Kannel 1982; Burke et al. 1989). Finally, several studies based on autopsy reports show declines in incidence of atherosclerosis over this period (Stamler 1981; Kannel 1982).

Further evidence comes from comparing trends across the specific chronic conditions (table 2). The conditions that exhibited the most dramatic changes in prevalence were potentially silent ones like hypertension, which generally require a physician's diagnosis. Other conditions that increased were among those that would be susceptible to earlier diagnosis—

for example, heart conditions. Unfortunately, prevalence estimates for heart disease cannot be derived from any current national source of clinical data (Higgins and Thom 1989; Harlan 1989). Conditions that would not be subject to earlier diagnosis, such as the loss of a limb, showed no trend.

Above and beyond this evidence of changing trends in diagnosis, we know that health care utilization grew rapidly during the 1960s and 1970s. Data from the NHIS show that the fraction of individuals who had visited a physician within the year prior to the survey increased substantially during the late 1960s and early 1970s and that the growth was largest among low-income households (National Center for Health Statistics 1982, 1990). Hospital admissions per capita also rose during most of the post–World War II period but have fallen quite dramatically since 1980 (National Center for Health Statistics 1982, 1990). It seems possible that these changes in utilization were spurred in part by the enactment of Medicare (1966) and Medicaid (1965) and by the growth in the fraction of the population covered by private health insurance (Bombardier et al. 1977; Health Insurance Association of America 1989; Advisory Commission on Intergovernmental Relations 1992).

Although we have primarily discussed early diagnosis and the effects of income support programs separately, it is easy to imagine that the two forces interact. For example, expanded availability of disability insurance might motivate individuals in poor health to seek a medical diagnosis confirming their inability to work. Alternatively, physicians diagnosing a specific condition might suggest that their patients apply for disability benefits or, more generally, might advise them to reduce their activities. Even for a condition like arthritis, where the source of the activity limitation is the symptomatic pain involved, it seems plausible that a clinical diagnosis might change behavior: knowing that they had a recognized condition might change individuals' expectations about eligibility for disability programs. Finally, knowing that a condition is chronic might lower individuals' expectations of recovering, perhaps leading them to give up a career job or otherwise alter their activities.

Discussion

Understanding trends in the health and well-being of the elderly population is of obvious importance. Along with trends in mortality, such trends are indicators of the success of medical technology and public health practice. Moreover, to the extent that we can expect such trends to continue, they have important implications for the demands on our health care system in the years to come.

Previous studies observed large and consistent declines in self-rated health during the 1970s. Combined with striking and contemporaneous declines in adult, age-specific mortality, these trends led some to argue that improvements in mortality had lowered the average health status of the older population. Although this hypothesis is plausible, the results we report in the section entitled "The Failure of the 'Failure of Success' " suggest that observed declines in self-reported health among the older population in the U.S. during the 1970s most probably do not reflect changes in the "actual" health of this population, and that these trends should *not* be taken as evidence in favor of the "failure of success."

Instead, we find evidence that important changes in the social, economic, and public health environments occurred during the 1970s, including the expanded availability of disability insurance and an increased emphasis on early detection of a variety of health problems. We find that observed trends in self-reported health status during the 1970s appear much more consistent with the effects implied by these forces than with alternative explanations. Although the nature of available data precludes definitively ruling out the possibility that, to some extent, observed declines in self-reported health during the 1970s reflect actual declines in health, our findings suggest that these declines can plausibly be interpreted as artifactual, reflecting changes in underlying social forces that influence individual awareness of, attitudes toward, and options for accommodating chronic health problems.

First, although mortality declined during the 1970s and 1980s, we find that self-reported health status declined only during the 1970s. Although it is possible that different forces underlay health trends in the 1970s and 1980s, respectively, we also find that the mortality declines, despite their considerable size, were too small to account for observed trends in health status in the 1970s. Third, we show that health status changed most among members of the population aged 45 to 64, who were both relatively less affected by changing mortality than older groups and relatively more affected by social and economic forces affecting reporting behavior. Fourth, the health measures that seem more sensitive to changing social and economic forces (e.g., activity limitations) changed more during the 1970s than indicators that would seem less sensitive (e.g., general health status). Fifth, we find that the chronic conditions for which prevalence changed most were among those most susceptible to earlier diagnosis (e.g., heart conditions). Finally, for the one condition (hypertension) for which we could compare self-reported prevalence with clinical evidence, we found no evidence that actual prevalence rates were rising during the 1970s.

Our findings illustrate the difficulty in drawing conclusions from available data on trends in health status since 1970 and raise the question of what types of data are necessary for making such inferences. With current survey technology, researchers wishing to describe the health status of the population can measure health in three broad ways: self-reports, physician reports, and clinical measures. Of these, clinical measures are often thought to be the least susceptible to social forces and other measurement problems. However, they are often difficult and expensive to obtain, and definitive clinical tests are only available for certain conditions but not for others (most notably arthritis). Furthermore, available clinical data are often based on self-selected samples (e.g., patients utilizing medical services) or samples that are drawn from local or regional populations. In consequence, nationally representative data permitting analysis of any clinical measures across several time periods have only recently become available. Perhaps most important, clinical measures may not provide the information needed to describe the outcomes of interest because they do not directly address questions regarding the extent to which health limits individuals' functional capacities or well-being—for many purposes a central question.

Relative to clinical measures, both physician reports and self-reports may be more likely to suffer from a variety of measurement problems. Both of these data sources are presumably susceptible to changes in diagnosis rates, for instance through changes in the timing and frequency of visits to physicians as well as in diagnostic technology and standards. Physician reports may additionally be sensitive to changes in the composition of the patient pool, complicating survey design. Finally, as with clinical data, physician reports may fail to provide the information needed to describe trends in functional ability and well-being. Thus, in many situations, self-reported indicators of health may be either all that is available to researchers or may be the most appropriate measures to use, even if they are influenced not only by an individual's health per se but also by other features of the individual's environment.

However, precisely because self-reports reflect both "objective" aspects of an individual's health and features of the individual's environment, it is important to take account of such features when interpreting self-reported data. The evidence we have reported illustrates the value of combining information from various sources and of considering the broader social context that may influence self-reports in a given time period or for a given population.

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Appendix: Calculations of Changes in Disability Income Receipt

Social Security Disability Insurance (SSDI) is not the only source of income for the disabled, nor was it the only source that was growing during the 1960s and 1970s. We would also like to know the extent to which changes in the fraction disabled have mirrored changes in the fraction receiving any kind of disability income. Unfortunately, this is difficult to estimate with precision. Program statistics on the number of individuals receiving different kinds of benefits do not contain information on benefit overlaps (individuals receiving benefit income from more than one program). As a result, simply summing across programs will give an overestimate of the number of individuals receiving some kind of disability transfer. Moreover, with the exception of SSDI, program statistics are not broken down by age or sex.

If we are willing to make assumptions about program overlap and demographic characteristics of recipients, however, statistics from administrative data can be used to make rough inferences about the fraction of the population receiving disability income. As of 1986, one-half of all SSDI recipients were men between the ages of 45 and 64 (one-quarter were women 45 to 64 years old, and one-quarter were men and women under the age of 45). Data from the *Supplemental Security Record* (McCoy and Weems 1989) show that in 1986 roughly 13 percent of SSI recipients were men 45 to 64 years old. Subtracting those who were also receiving SSDI leaves roughly 11 percent of all SSI recipients. Finally, we assume that roughly 50 percent of those receiving railroad disability, public employee disability, and black lung benefits are 45- to 64-year-old men.

Summing these numbers, we estimate that a total of 2.1 million 45- to 64-year-old men—or 9.9 percent of civilian, noninstitutionalized men in this age group—were receiving some kind of disability benefits in 1986, with nearly two-thirds of these receiving SSDI. The NHIS shows that, in 1986, 10.6 percent of 45- to 64-year-old men were identified as unable to work. This suggests that, in 1986, the vast majority of men who identified themselves as disabled did, in fact, receive transfer income.

Furthermore, under the same assumptions as above, we calculate that 11.2 percent of 45- to 64-year-old men were receiving disability benefits in 1980, whereas the NHIS data show 10.9 percent of this group reporting themselves as unable to work. For 1970, we estimate that 6.5 percent of 45- to 64-year-old men were receiving disability income, and the NHIS shows 7.4 percent identified as unable to work. These calculations suggest that once we take into account several sources of transfer income targeted at the disabled, the fraction of 45- to 64-year-old men receiving such benefits rose somewhat *more* rapidly during the 1980s than did the fraction identified as unable to work.

Women are about half as likely as men to receive SSDI benefits (due in part to the work history requirement for receiving SSDI). As a consequence, despite the fact that the proportional rise in the number of individuals receiving SSDI benefits during the 1970s was greater for women than for men, the rise in the fraction of women receiving SSDI benefits, from 1.7 percent to 3.3 percent, was too small to account for any sizable portion of the observed increases in the number identified as unable to work.

For women, however, it is particularly important to take into account other sources of transfers. There are as many working-aged women receiving SSI as there are receiving SSDI. Using the strategy that we employed for men, we can estimate the growth of the fraction of women receiving some kind of disability benefit. In 1986, 26 percent of those receiving SSI benefits were 45- to 64-year-old women. Assuming that 45- to 64-year-old women represented the same proportion of SSI recipients in 1980 and APTD (Aid to the Permanently and Totally Disabled, the predecessor to SSI) recipients in 1970, and that roughly 25 percent of the recipients of public employee disability benefits are 45- to 64-year-old women, we calculate that the fraction of women receiving disability benefits rose from 3.3 percent in 1970 to 6.6 percent in 1980. This 3.3 percentage point increase in the fraction of women receiving disability transfers approximates the 2.3 percentage point increase in women identified as unable to work in the census.