Journal of Pension Economics and Finance (2024), **23**, 165–182
doi:10.1017/S1474747223000033

CAMBRIDGE UNIVERSITY PRESS

ARTICLE

Are older workers capable of working longer?

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(Received 2 July 2021; revised 11 January 2023; accepted 16 January 2023; first published online 13 February 2023)

Abstract

Disability-free life expectancy had been rising continuously in the United States until 2010, suggesting working longer as a solution for those financially unprepared for retirement. However, recent developments suggest improvements in working life expectancy have stalled, especially for minorities and those with less education. This paper uses data from the *National Vital Statistics System*, the *American Community Survey*, and the *National Health Interview Survey* to assess how recent trends, up to 2018, in institutionalization, physical impediments to work, and mortality have affected working life expectancy for men and women age 50, by race and education.

Key words: Disability; gender disparities; life expectancy; racial disparities; working longer

JEL codes: I14; J11; J14; J26

Working longer is a key to securing a comfortable retirement (Munnell and Sass, 2008; Bronschtein *et al.*, 2019). However, health shocks are known to push older workers out of the labor force before their intended retirement date (Coile and Levine, 2007; Munnell *et al.*, 2018*b*). Until 2010, the trend of rising disability-free life expectancy in the United States suggested increasing scope for longer working lives (Munnell *et al.*, 2008; Cutler, 2009; Cutler *et al.*, 2014; Crimmins *et al.*, 2016; Chernew *et al.*, 2017), but recent developments may have stalled this progress.

This paper examines the period 2006–2018 to explore how long individuals can expect to be able to keep working, and how these expectations vary across racial and socioeconomic status (SES) groups. The analysis mirrors that of Munnell *et al.* (2008), combining mortality data from the *National Vital Statistics System* (NVSS) with data on the total and institutionalized population from the *American Community Survey* (ACS), and data on work-limiting impairments from the *National Health Interview Survey* (NHIS).

These datasets are used to estimate cumulative probabilities of mortality, institutionalization, and disability at each age after 50 for different demographic and education groups. The resulting profiles of working life by age are then used to calculate working life expectancy at 50 for each group. These expected additional years of working ability are estimated for each year between 2006 and 2018.

The concept of working life expectancy here parallels the concept of period life expectancy in the purely mortality-based context. It is a summary measure of remaining work ability at a given moment for a cross-section of the population, but does not reflect the expectation of future years of work ability for any specific person. In particular, with respect to institutionalization, the averages reflect the pattern of institutionalization by age at a given time but do not account for shifting patterns of institutionalization by age over time, nor for the fact that an individual who is institutionalized already is likely to remain so in the next year, while one who is not institutionalized is relatively unlikely to

become so. This exercise is therefore descriptive, and not directly applicable to prediction for a specific individual or even cohort.[1]

The resulting trends nevertheless suggest cause for concern. While overall life expectancy at age 50 displays moderate improvement for the general population and for every demographic group since 2006, the same is not true for working life expectancy. Working life expectancy at 50 has increased slightly for high-education groups – Black and white, men and women. However low-education groups have, with the exception of Black women, experienced stagnation in their working life expectancy. This pattern suggests that calls for older workers to delay retirement, which have proven successful over the past couple of decades, may be less fruitful going forward.

The rest of the paper proceeds as follows. Section 2 presents the current state of the literature. Section 3 discusses the data and methodology for the analysis. Section 4 estimates the components of working life expectancy – mortality, institutionalization, and work-limiting disability – and working life expectancy at age 50 for the full population segmented by gender. Section 5 shows the same estimates broken out by the various racial and SES groups. The final section concludes that working life expectancy has improved since 2006 primarily among the more highly educated, while lower-educated individuals have experienced stagnation in working life expectancy.

1. Background

The main question in this paper is how long people will be able to work and how this varies by education, race, and gender. Prior work on disability-free life expectancy – how long individuals can expect to live without a disability – does not answer this question. Most studies of health trends define poor health as an inability to perform activities or instrumental activities of daily living (ADLs and IADLs). But ADLs and IADLs are an extreme form of functional limitation; ailments that are both more prevalent and less severe are also likely to prevent people from working (Burkhauser *et al.*, 2002).

Coile and Duggan (2019) conduct one of the few analyses of work-limiting disability. They find that, among men ages 45–54 without a college degree, 1.7 percent reported an ADL in 2015, compared to 16.0 percent reporting a work-limiting health condition; the comparable shares for those with a college degree were 0.9 and 7.5 percent. But since the authors limit their sample to prime-age men, the prevalence of work-limiting health conditions among near-retirees of both genders remains unexamined. Differences by race and education are similarly unexplored.

The period covered by the current analysis includes the troubling acceleration of 'deaths of despair' among middle-age workers (Case and Deaton, 2015), growing inequality, the Great Recession, and the subsequent recovery. Following these upheavals, the analysis explores both whether past trends in working life expectancy have changed and whether these trends vary by SES and race. Since less-educated whites and non-whites tend to approach retirement with fewer resources, declines in work capacity could prevent delayed retirement among the very individuals who would most benefit from it (Hou and Sanzenbacher, 2020; Biggs *et al.*, 2021; Munnell *et al.*, 2022).

Recent trends suggest cause for concern. Health status – measured by self-reported health, activities and instrumental activities of daily living, and obesity – has worsened over the past two decades (Martin *et al.*, 2010; Lezzoni *et al.*, 2014). This decline has been particularly acute for workers without a college degree (Cutler *et al.*, 2014; Coile and Duggan, 2019). At the same time, the separate trend of rising educational attainment, which helped spur past improvements in disability-free life expectancy, has largely played out, as average educational attainment in the United States, which had been rising

[1]Moreover, the types of jobs available in the labor market determine which abilities and disabilities permit workers to find jobs and thus impact when individuals report that a health condition prevents them from working. A large literature, starting with the seminal paper by Autor and Duggan (2003), finds that SSDI applications and awards respond to labor demand: when demand is low, applications and awards rise (and see Maestas *et al.*, 2021, for analysis of more recent data). In the context of this paper, the relationship between labor demand and work ability is attenuated, because disability here is measured by underlying health rather than SSDI application or receipt (eligibility for which formally requires that no job suitable to the applicant's ability exist in the economy).

for decades, has flattened in recent cohorts (Munnell *et al.*, 2008). And a long-term decline in nursing home use has mostly reduced institutionalization over age 80, when work is largely irrelevant (Kaiser Family Foundation, 2021).

Adding to worries about the work ability of low-education individuals, particularly Black individuals, are rising incarceration rates (U.S. Bureau of Justice Statistics, 2021). Despite incarceration rates falling for younger men over the period 2000–2016, they nevertheless continued to increase among middle-age men, reflecting the increase in incarceration of younger men in years past (Coile and Duggan, 2019).[2] Much like institutionalization in long-term care facilities, incarceration is a nearly insurmountable impediment to work.

Compounding trends in health, trends in mortality among the working-age population are also not encouraging. Although life expectancy has risen across the population over the past several decades (the COVID-19 pandemic notwithstanding), the gains have mostly occurred at older ages when individuals are well past retirement age (Chernew *et al.*, 2017).[3] More troubling, recent studies have even found an increase in prime-age mortality rates among less-educated whites (Case and Deaton, 2020).

The analysis brings together these disparate trends in mortality, institutionalization, and work-limiting disability. It explores the trends by gender, race, and SES, and combines the different measures of work capacity into a summary measure of working life expectancy.

2. Data

'Working life expectancy' – the additional years of work ability an individual can expect at a given age – depends on three components: (1) mortality risk; (2) the risk of institutionalization; and (3) the risk of work-limiting disabilities in the non-institutionalized population.[4] Each of these probabilities is estimated based on some combination of the NVSS, the ACS, and the NHIS, for the years 2006–2018. The NVSS gives the number of deaths in each demographic group defined by gender, race, and education. The ACS gives the total population in each such group as well as the institutionalized population. The NHIS is used to estimate the share of each demographic group in the community that suffers from a work-limiting disability. These components are estimated for each five-year age bracket after age 50 and for each SES group.[5]

2.1 Defining the demographic groups

To estimate working life expectancy for different SES groups, it is first necessary to define the groups. Race and gender are relatively straightforward and the definitions follow those of the Census Bureau; the analysis focuses on non-Hispanic white and Black men and women.

However, defining relative education groups involves some discretion. Following Dowd and Hamoudi (2014), absolute levels of education are recognized as capturing increasingly more selection by unobserved characteristics. Thus, similar to Bound *et al.* (2015), Sanzenbacher *et al.* (2019) and Wettstein *et al.* (2021), education in this analysis is defined in relative, rather than absolute, terms.

The assignment of individuals to their appropriate educational group is as follows. First, the ACS is used to determine the median level of education for each gender-race-cohort group.[6] Next, individuals

[2]Thus, 'period' working life expectancy reflects, among other things, the relatively high incarceration rates of current middle-age and older adults, and does not account for a possible decline in these rates for those who will be middle-age or older in the coming years.

[3]Increases in life expectancy have an ambiguous effect on retirement preparedness. On the one hand, reductions in mortality in mid-life allow workers to work longer and accumulate more resources for retirement (both their own and their spouses'). On the other hand, reductions in late-life mortality rates present households with longer retirements, increasing the need for resources.

[4]See Crimmins *et al.* (1989, 1997) and Munnell *et al.* (2008).

[5]Mortality is estimated at each year of age. The other two measures are estimated by 5-year age bins to increase sample size.

[6]Note that education quantile is, therefore, race-cohort-gender specific. This approach recognizes the fact that attaining an equivalent absolute level of education (e.g., a college degree) implies greater selection for Black individuals than for whites, given the overall lower educational attainment among Black individuals. For further discussion see Leive and Ruhm (2021),

in each of the datasets are assigned to be either above or below the median for their demographic group.[7] To allocate marginal absolute levels of education to above/below the median, individuals in the marginal groups are randomized in the appropriate proportions.[8]

2.2 Mortality estimates

Age-specific mortality rates, q, for each demographic group defined by gender, race, and education are calculated year by year with the following formula:

$$q_{x,i,j} = \frac{d_{x+1,i}}{l_{x,i}}, \tag{1}$$

where x is age, i represents each demographic group, j represents year, $l_{x,i}$ is the number of individuals alive in group i at age x using ACS data, and $d_{x+1,i}$ is the number of individuals in group i who die between ages x and $x+1$ using the NVSS data. To correct for small cell size, the analysis adjusts the age-specific mortality rates using the Gompertz–Makeham formula (see Brown 2002 and Sanzenbacher and Ramos-Mercado 2016), estimated with non-linear least squares.

2.3 Institutionalization estimates

The share of each gender-race-education group living in institutions in each year is estimated from the ACS. Institutions include both long-term services and supports (LTSS) facilities (such as nursing homes) and carceral institutions such as prisons. Incarceration has played a large and growing role in low labor force participation over the past few decades, particularly among Black men (Coile and Duggan, 2019).

2.4 Work-limiting disability estimates

The estimate of the risk of work-limiting disability relies on three questions in the NHIS: (1) Does a physical, mental, or emotional problem keep you from working? (2) Are you limited in the kind/amount of work you can do because of your health? and (3) Are you limited in any way because of physical, mental, or emotional problems?[9] Following Crimmins *et al.* (1997), individuals are considered disabled if they respond yes to any of these questions.[10]

who take the complementary approach of assigning quantiles across race. In their setting, therefore, Black individuals are overrepresented in lower-education groups, and White individuals are overrepresented in higher-education groups. Our approach ensures that each race has equal shares in the education quantiles.

[7]For consistency, all education was coded in both the ACS and NVSS records to correspond to the number of completed years of education. In the NVSS, where education was classified by category rather than completed years, the following recoding was assumed: 8th grade or less = 8; 9th – 12th grade, no diploma = 11; high school or GED = 12; some college = 13; associate's degree = 14; bachelor's degree = 16; Master's degree = 18; doctorate or professional degree = 21. In the ACS, the recoding was: no schooling = 0; nursery-4th grade = 4; 5th – 8th grade = 8; 9th grade = 9; 10th grade = 10; 11th grade = 11; 12th grade = 12; one year of college = 13; two years of college = 14; three years of college = 15; four years of college = 16; five or more years of college = 17. While this recoding necessarily entails some error in assigning precise years of education, this error is likely to have a minimal effect on the assignment to below/above median education, which is the measure of education used in the analysis.

[8]This approach is similar to that of Meara *et al.* (2008), Bound *et al.* (2015), and Leive and Ruhm (2021).

[9]All results by education should be cognizant of the fact that different levels of education are necessary for different occupations, and that different disabilities are also differentially constraining in different occupations. The analysis here takes the occupations of respondents as given, and because the surveyed individuals are queried in their 50s and later, education is also assumed to be given. Thus the disability reported by highly-educated individuals reflected work limitations appropriate to their level of education, in the occupation they are or were, in fact, employed in.

[10]The results look qualitatively similar when disability is defined more restrictively, as responding 'yes' only to one or both of the first two questions. See Appendix for results using this restrictive definition.

The final stage of the analysis estimates the probability of being able to work at a given age by multiplying the probabilities of being alive, non-institutionalized, and without a work-limiting disability. This is calculation is summarized in equation (2):

$$W_{i,a} = s_{i,a} \times c_{i,a} \times h_{i,a}, \tag{2}$$

where $W_{i,a}$ is 1 if individual i is capable of work at age a and $s_{i,a}$, $c_{i,a}$, and $h_{i,a}$ represent the probability that individual i survives, in the community, and is healthy enough to work, respectively, at age a conditional on having been so in the previous period. Working life expectancy, at the current age, is the sum of this product over all future ages.

3. Estimates of key metrics for the full population

The methods outlined above produce three sets of probabilities – dying, entering an institution, and developing a work-limiting disability – for each demographic group, and for the full population. These estimates are calculated for every year between 2006 and 2018, producing time trends in the three risks.

3.1 Life expectancy trends

Appendix Tables A1 and A2 show the evolution of life expectancy at age 50 between 2006 and 2018, for men and women. At this age, life expectancy has steadily increased for both genders. From 2006 to 2018, period life expectancy increased by just over one year for men and by almost 1.2 years for women. Cohort life expectancies, which are generally higher since they reflect the predicted improvement of mortality in future years, also show steady increases. Even though period life expectancy overstates likely mortality, estimates of future improvement in mortality by demographic group are not available. Furthermore, the period approach is also consistent with the approach taken with respect to institutionalization and disability, which will also not account for changes across cohorts in incarceration rates and health. Hence, the rest of the analysis will proceed using period mortality estimates.

3.2 Institutionalization trends

Appendix Tables A3 and A4 show trends in the share of the population that is institutionalized in each five-year age bin from age 50 and up, for men and women respectively. The data display a number of patterns pertinent to working life expectancy.

First, institutionalization rates generally increase with age. This pattern is not surprising as institutionalization in mid- to late-life typically reflects residence in LTSS facilities, and LTSS needs rise sharply with age.[11] More unusual is the departure from this pattern for men, whose institutionalization rates *decline* in their 50s only to begin rising in their 60s. A substantial portion of men (but not women) in their 50s are incarcerated, with this share declining with age. Because so few individuals at these ages have LTSS needs, the age-related decline in incarceration swamps the small increases in LTSS facility use. However, by age 60, a growing need for LTSS results in the expected increasing slope of institutionalization with age going forward.

The other noteworthy patterns in the data concern time trends. Institutionalization at each age declines over time, particularly at older ages, reflecting a long-term reduction in nursing home use.[12] Again, men in their 50s and 60s stand out. While institutionalization is stable or declining for women at these ages (and sharply declining at older ages for both genders), the percentage of men in their 50s and 60s who are institutionalized has increased since 2006. This pattern likely reflects

[11]U.S. Department of Health and Human Services (2018).

[12]This trend predates COVID-19 but has accelerated during the pandemic.

Table 1. Expectations at age 50 of years spent in various states for men

Expectation of life				Change		
	2000	2006	2018	2006–2018	2000–2006	2000–2018
Total	27.00	28.59	29.77	1.18	1.59	2.77
Free of disability	19.99	21.30	21.80	0.50	1.30	1.80
With disability	6.53	6.77	7.46	0.69	0.24	0.93
Institutionalized	0.47	0.52	0.51	−0.01	0.05	0.04

Sources: Authors' calculations using NHIS (2000–2018); ACS (2000–2018); and NVSS (2000–2018).

Table 2. Expectations at age 50 of years spent in various states for women

Expectation of life				Change		
	2000	2006	2018	2006–2018	2000–2006	2000–2018
Total	30.98	32.52	33.56	1.04	1.54	2.58
Free of disability	22.00	23.26	23.85	0.60	1.26	1.85
With disability	8.29	8.55	9.22	0.67	0.26	0.93
Institutionalized	0.69	0.72	0.49	−0.23	0.03	−0.20

Sources: Authors' calculations using NHIS (2000–2018); ACS (2000–2018); and NVSS (2000–2018). Values for the year 2000 are from Munnell *et al*. (2008).

the increasing prevalence of long prison sentences in the last few decades, which are imposed primarily on younger men who then reach their 50s and 60s in correctional institutions.[13]

3.3 Work-limiting disability trends

Appendix Tables A5 and A6 show the share of the non-institutionalized population with a work-limiting disability, for men and women respectively. Unsurprisingly, disability rates increase with age. More importantly, disability rates within a given age group do not seem to have systematically changed over time. In other words, holding age constant, work-limiting disability rates have held steady; thus the growth in total life expectancy implies *more* expected years of disability now than fifteen years ago, as additional years are added at older ages where disability rates are high. Working life expectancy will, indeed, be shown to reflect this fact.

3.4 Working life expectancy at age 50

Tables 1 and 2 show how many additional years a 50-year old man (woman) can expect to live, in total and in each of the states relevant to working life expectancy: not institutionalized and free of disability (i.e., capable of work), not institutionalized with a disability, and institutionalized. Furthermore, the tables also show how expected years in each of these states have changed since 2000 and since 2006, decomposing the change in total life expectancy into changes in the three relevant states of life.

In 2018, a 50-year-old man could expect to live an additional 29.8 years, and in 21.8 of those years he would be expected to be capable of work. For a woman, the corresponding numbers are 33.6 and 23.9. The remaining years are expected to be life in the community with some work-limiting disability, with only about half a year in an institution.[14]

[13]Prison sentences are not only an impediment to work while they last, but also lead to a permanent loss of earning capacity even for those who do reenter the labor market (see. for example, Agan and Starr 2018). While the latter is beyond the scope of this analysis, the estimated impact of institutionalization on the ability of individuals, particularly men, to provide for themselves and their families must therefore be seen as a lower bound of the total effect.

[14]This estimate is slightly lower than the estimate in Hurd *et al*. (2017) of an average of 272 nights, or 0.75 years, in a nursing home for individuals ages 57–61. The difference is likely accounted for by the older ages of individuals in that

How have these expectations changed since 2006? Men (women) have gained 1.2 (1.0) years of total life expectancy over the time period. These years can be decomposed into 0.5 (0.6) years of work-capable life, 0.7 (0.7) years of life in the community with a disability, and slight declines in years of life in an institution (primarily among women, who have seen a decline of 0.23 years of expected life in this state). Thus, every year of added life is approximately evenly divided between work-capable and work-incapable.[15]

This pattern is very different from trends in the preceding period, from 2000 to 2006. In the earlier period, total life expectancy rose more in six years than it did in the 12 years between 2006 and 2018. The difference in the evolution of disability-free life expectancy is even more stark: between 2000 and 2006, expected years with a disability rose only by about one quarter of a year compared with 1.5 years of total life, unlike the latter period where over half of additional years of expected life were years with a disability.

The absolute numbers in Tables 1 and 2 may seem encouraging. While only about half of the additional year of life gained since 2006 is time that can be used for work, even this slow progress still means that the average person can work until their early 70s. However, the average does not tell the full story: certain groups have made more progress than others, and even within groups a substantial share of individuals may not be able to work as long as the average group member. The next section explores heterogeneity in working life expectancy to get at these disparities.

4. Heterogeneity in working life expectancy

Appendix Tables A7 and A8 show the percentage of the non-institutionalized population with a work-limiting disability for each demographic group at ages 50–64. Disability rates have increased for every gender, race, and education group over the sample period.[16] Disability rates will be joined with mortality estimates to form working life expectancy.

The analysis now turns to estimating total life expectancy for each demographic group. The top panels of Tables 3 and 4 show, for men and women at age 50, the number of years an individual of each race-education group can expect to live. All of the groups experienced gains in life expectancy between 2006 and 2018. These gains ranged from small (low-education White women and men gained only about half a year) to large (Black men with high education and Black women with low education had gains of over two years).[17]

The modest gains by low-education whites are emblematic of the opioid epidemic, and 'deaths of despair' more generally, which have been particularly devastating among low-SES Whites. In contrast, high-education Whites experienced more robust gains in life expectancy over the analysis period. The lack of systematic patterns by SES among Black individuals echoes similarly disparate results in other recent work (Leive and Ruhm, 2021; Wettstein *et al.*, 2021).

study versus the current one and the earlier time period of that previous study, which included years 1992–2010. Indeed, looking at women in 2006 in Table 2 yields an estimate very close to the previous study's.

[15]As expected, using an alternative definition of work-limiting disability that omits the question 'are you limited in any way because of physical, mental, or emotional problems?' results in more of the additional years of life being healthy and fewer being years with a disability, although the differences are small. The qualitative patterns are robust to using this alternative definition. See Appendix Tables A10 and A11.

[16]How can this finding be reconciled with the relatively stable rates of disability in Tables A5 and A6? The explanation rests on the fact that the 50–64-year-old group, as a whole, has grown older over time. Table A9 shows the average age of this group, by gender. The population of those who might conceivably work longer has gotten 0.7 and 0.6 years older, for men and women respectively. This increase in average age, while generally small, has likely led to increases in work-limiting disability in the older working-age population for all the demographic groups.

[17]These groups also had the lowest and highest average annual gains in life expectancy over the period. Low-education White men and women gained 0.05 ($p = 0.021$) and 0.02 (not significantly different from 0) years of expected life per year. In contrast, Black men with above-median education gained 0.18 ($p < 0.001$) years of expected life per year, on average, between 2006 and 2018. The corresponding number for below-median education Black women was 0.16 ($p < 0.001$).

Table 3. Total life expectancy and working life expectancy for males at age 50, by education and race

Year	White		Black	
	Below median education	Above median education	Below median education	Above median education
Total life expectancy				
2006	26.60	30.91	23.26	26.32
2007	26.73	31.17	23.46	26.77
2008	26.57	31.33	23.38	27.10
2009	26.94	31.47	23.49	27.58
2010	27.31	31.50	24.14	27.65
2011	27.33	31.55	24.42	27.93
2012	27.36	31.82	24.36	28.27
2013	27.35	31.77	24.36	28.34
2014	27.38	31.89	24.76	28.29
2015	27.09	32.15	24.29	28.84
2016	27.24	32.07	24.31	28.46
2017	27.13	32.13	24.40	28.39
2018	27.15	32.34	24.06	28.62
2006–2018 change	0.55	1.43	0.80	2.30
Working life expectancy				
2006	18.95	24.25	14.77	18.83
2007	18.44	24.98	13.37	18.46
2008	18.46	24.70	14.64	19.40
2009	18.37	24.87	13.22	20.04
2010	19.14	25.17	14.57	19.10
2011	18.38	24.99	13.08	19.95
2012	18.93	25.16	14.24	20.69
2013	19.15	25.48	15.35	20.56
2014	19.04	25.50	14.46	20.14
2015	18.73	25.78	14.69	21.32
2016	18.79	25.39	14.53	19.59
2017	18.80	25.11	14.48	19.78
2018	18.51	25.44	13.39	19.67
2006–2018 change	−0.44	1.19	−1.38	0.84

Sources: Authors' calculations using NHIS (2000–2018); ACS (2000–2018); and NVSS (2000–2018).

In contrast to total life expectancy, where all groups saw at least nominal improvement over the past two decades, working life expectancy displays qualitative differences across groups.[18] The bottom panels of Tables 3 and 4 show the additional years of working life that individuals of each demographic group can expect at each year between 2006 and 2018. Examining the differences between 2006 and 2018 gives a sense of these disparities, with high-education White women gaining 1.4 years of expected work capacity, while Black men with low education had 1.4 *fewer* years of expected work capacity at the end of the period than at the beginning.

Just looking at the change between 2006 and 2018 is noisy, especially for Black groups due to small sample sizes. Hence, Figure 1 shows the average annual change in working life expectancy over the analysis period for each group. This average is calculated using an OLS regression with a linear term in year, with each year-demographic group considered as a single observation. The calculation does not account for the fact that each such working life expectancy estimate is itself an estimate. With this caveat, the simple average improvement is highly statistically significant for all

[18]The patterns of working life expectancy are generally similar when using the more restrictive definition of work-limiting disability that does not consider those who answer the question 'are you limited in any way because of physical, mental, or emotional problems?' as having a work-limiting disability. As expected, working life expectancy is higher under this definition, but trends over time and across demographic groups are qualitatively similar. See Appendix Tables A12 and A13.

Table 4. Total life expectancy and working life expectancy for females at age 50, by education and race

Year	White		Black	
	Below median education	Above median education	Below median education	Above median education
Total life expectancy				
2006	31.20	33.78	28.74	30.47
2007	31.44	34.03	29.34	30.57
2008	31.14	34.15	29.07	31.08
2009	31.57	34.37	29.15	31.55
2010	31.63	34.12	29.89	31.28
2011	31.66	34.25	30.35	31.17
2012	31.67	34.36	30.41	31.93
2013	31.60	34.43	30.35	31.57
2014	31.70	34.60	30.51	31.81
2015	31.31	34.71	30.61	31.73
2016	31.59	34.72	30.43	31.76
2017	31.47	34.70	30.54	31.93
2018	31.57	34.91	30.82	32.08
2006–2008 change	0.37	1.13	2.08	1.61
Working life expectancy				
2006	21.28	25.58	16.34	21.56
2007	21.46	25.32	15.58	19.90
2008	20.14	25.68	15.63	20.72
2009	21.19	25.70	16.37	20.71
2010	21.34	25.72	16.69	20.63
2011	21.10	25.20	16.46	20.85
2012	21.86	26.08	17.08	21.38
2013	20.96	25.71	17.49	22.20
2014	21.40	26.01	16.50	20.96
2015	20.82	26.33	17.18	21.95
2016	21.25	26.26	17.66	22.22
2017	20.61	26.44	17.18	21.64
2018	21.03	26.94	16.66	22.24
2006–2008 change	−0.25	1.36	0.32	0.68

Sources: Authors' calculations using NHIS (2000–2018); ACS (2000–2018); and NVSS (2000–2018).

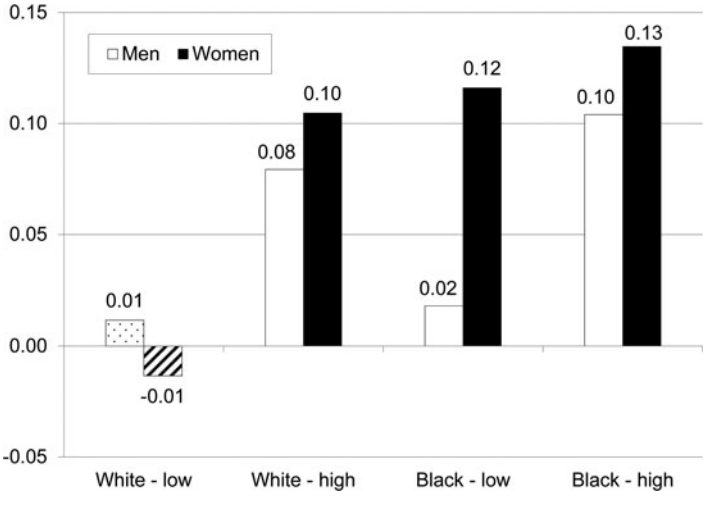

Figure 1. Average annual change in working life expectancy between 2006 and 2018 by demographic group. *Sources*: Authors' calculations using NHIS (2000–2018); ACS (2000–2018); and NVSS (2000–2018).
Note: Solid bars are significantly different from 0 at the 10-percent level.

the high-education groups, besides Black men for whom the change is marginally significant ($p < 0.08$). The positive slope for low-education Black women is also highly significant ($p < 0.001$).

A stark divide is apparent: Both high-education Black and White individuals experienced an increase of about 0.1 years of working life expectancy per year on average. A similar improvement was seen for Black women with low education. However, the other low-education groups saw no annual improvement, on average, in working life expectancy.

The lack of growth in working life expectancy for most low-education groups means that, even as their total life expectancy has improved, their ability to work longer has not. In particular, low-education Black men begin and end the period with roughly the same low working life expectancy at age 50; the average member of this group will not be able to work past age 63. This lack of progress is, in fact, a step back in terms of retirement security, since the inability to work to a later age is now accompanied by a need to finance a longer retirement.

4.1 Simulating how long different individuals can work

To more fully explore how long different types of people can work, the analysis uses the estimated life, institutionalization, and work-limiting disability tables to track how ability to work declines with age using the most recent data, from 2018. Figures 2a and 2b show the estimated share of individuals in each group who will be unable to work to each age. The figure is generated by simulating the experience of 100,000 individuals of each demographic group who are capable of work at age 50. As these simulated individuals age, more and more of them die, enter institutions, or develop work-limiting disabilities.[19]

The patterns of decline in work capability are starkly different across demographic groups, consistent with the estimates in Tables 3 and 4. For example, of those capable of work at age 50, fully 81 percent of high-education white men will still be capable of work at age 70, the latest age for claiming Social Security. In contrast, only 19 percent of low-education Black men will have that capability.

The analysis above begs the question: if individuals are expected to work longer, how many of them will be unequal to the task? For example, the raising of the Social Security Full Retirement Age from 65 to 67 implied no loss of monthly benefits – for those who could postpone claiming by two years. What share of people in each demographic group would be able to postpone retirement by two years from age 62, the Early Eligibility Age?

To answer this question, the analysis builds on the estimated probabilities of mortality, institutionalization, and work-limiting disability at each age after age 50 in 2018. Using the same simulation approach described to generate Figures 2a and 2b, the analysis takes an individual at age 62 and calculates the probability that they will still be capable of work by age 64. Figure 3a shows the result of this exercise. Unsurprisingly, in the general population, only 7 percent of men and 4 percent of women would be forced to drop out of the labor force by death, institutionalization, or disability by age 64. However, the picture is much less rosy when considering those with low education and Black individuals. Among those with low education, over 10 percent of each group would be unable to work even to age 64 (except for low-education White women for whom the share is 7 percent). Similarly, among Black individuals, the different gender and education groups have a greater than 10 percent chance of

[19]The simulation accounts for the fact that while death is an absorbing state, institutionalization and work-limiting disability are not. The ability to leave institutions is particularly important, considering the non-monotonic relationship between age and disability among men, due to declining incarceration rates with age in their 50s and 60s. Thus, each individual in the simulation receives a single random draw between 0 and 1, which is compared to his cumulative survival probability to determine age of death; and a random draw for each age which is independently compared to the probability of being resident in the community without a work-limiting disability. However, this calculation assumes independence within individual across years in this latter probability. This independence assumption is surely incorrect but is conservative in the following sense: it will overestimate the share of individuals who are capable of work, since each individual gets a new chance to leave the work-incapable state at each age.

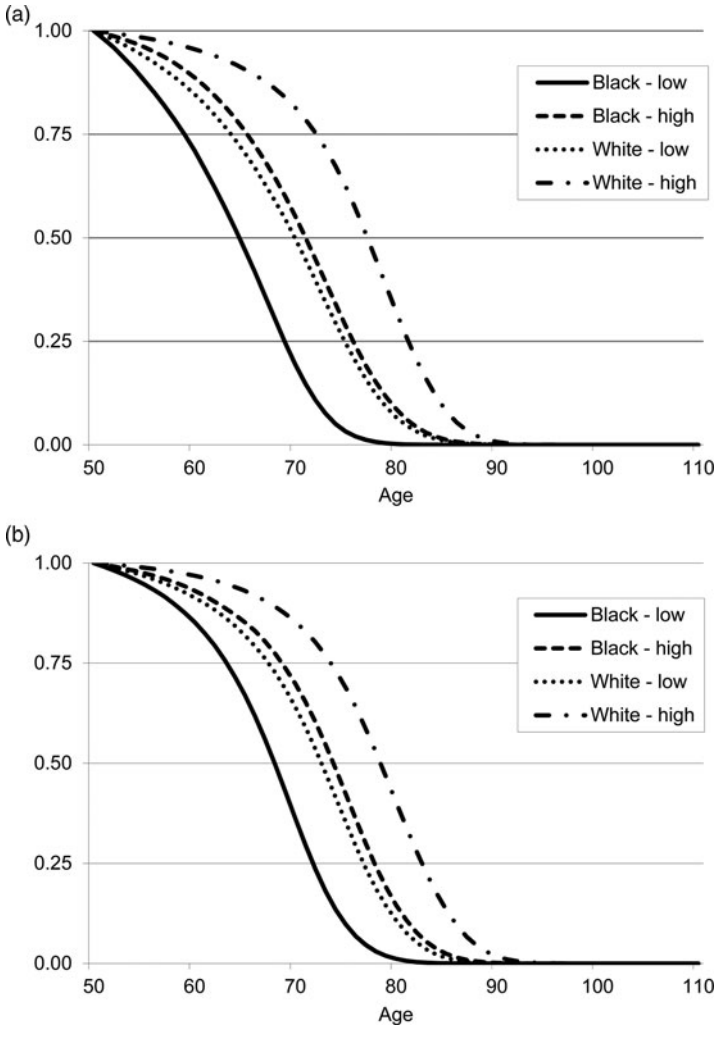

Figure 2. (a) Fraction of men capable of work at age 50 who can still work at future ages, by race and SES. *Sources*: Authors' calculations using NHIS (2000–2018); ACS (2000–2018); and NVSS (2000–2018). (b) Fraction of women capable of work at age 50 who can still work at future ages, by race and SES. *Sources*: Authors' calculations using NHIS (2000–2018); ACS (2000–2018); and NVSS (2000–2018). *Note*: Based on 100,000 simulations for each group.

being unable to work until 64, except for high-education Black women (for whom the share is 6 percent).

The intersection of the two most disadvantaged groups is, unsurprisingly, the least likely to be capable of working to age 64. Sixteen percent of low-education Black women capable of work at age 62 will no longer be able to work by age 64. For low-education Black men, almost a quarter of those capable of work at 62 will no longer be capable two years later.[20] Thus substantial shares of the Black population, particularly men, cannot be expected to work much later than age 62.

Looking beyond age 64, outcomes continue to look grim for Black and low-education groups – particularly low-education Black individuals. Figure 3b shows that around a quarter of low-education White men who can work at 62 will not be capable of working to the Full Retirement Age (FRA) of 67. A similar share of high-education Black men will be in the same predicament. Strikingly, more than half of low-education Black men capable of work at age 62 will prove incapable of working to the FRA. When it comes to working until the maximal claiming age of 70, Figure 3c shows that only high-education Whites will not experience rates of inability to work in excess of 20 percent. Among all

[20]Recall that even the average individual in the latter group cannot work to age 64; their working life expectancy is 63.4 at age 50. The 24 percent in Figure 3a is conditional on still being alive and capable of work at age 62.

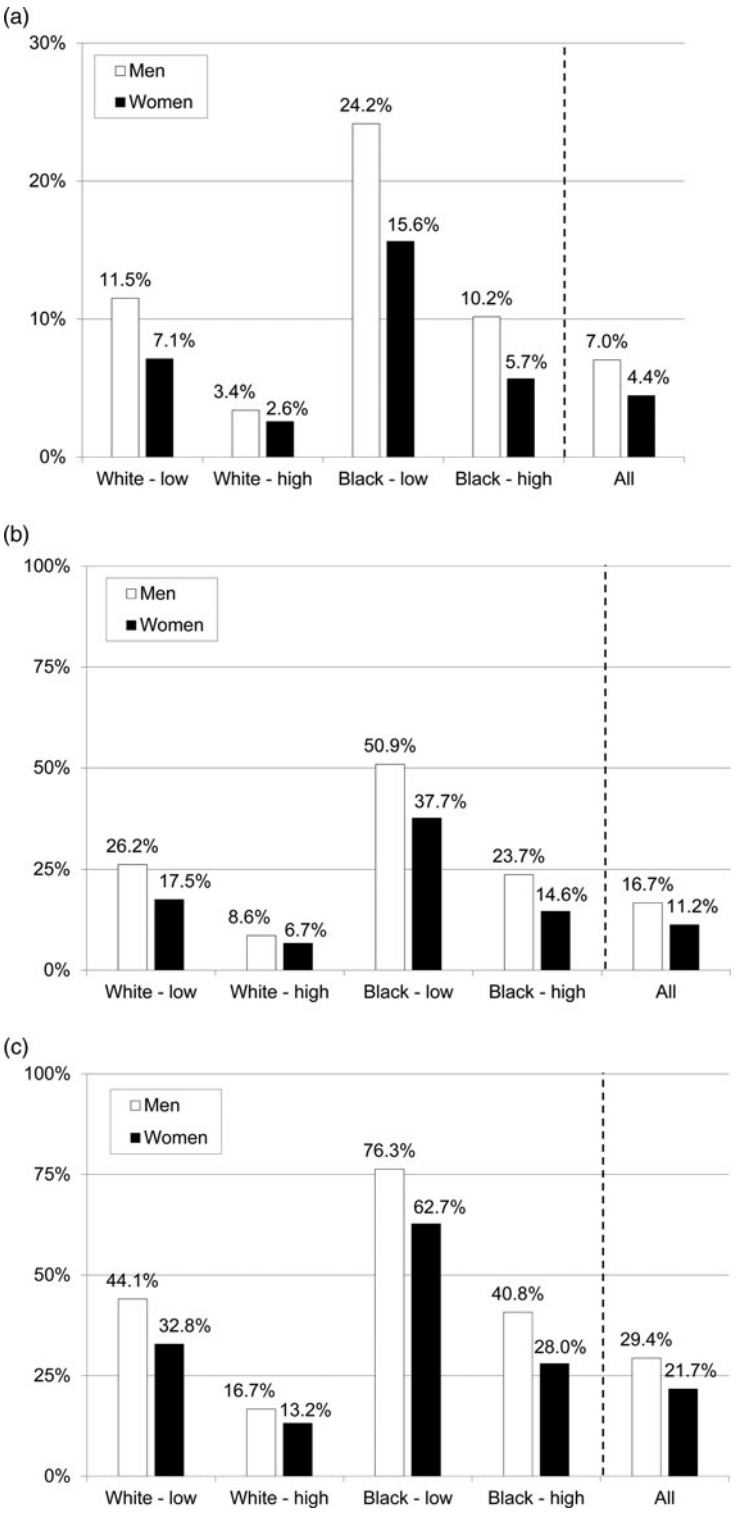

Figure 3. (a) Percentage of individuals capable of work at age 62 who will not be capable by age 64, by demographic group. *Source*: Authors' calculations. (b) Percentage of individuals capable of work at age 62 who will not be capable by age 67, by demographic group. *Source*: Authors' calculations. (c) Percentage of individuals capable of work at age 62 who will not be capable by age 70, by demographic group. *Source*: Authors' calculations. *Note*: Based on 100,000 simulations for each group.

other groups of both genders, of those who can work at age 62, more than a quarter will not be able to work until age 70. For low-education Black men, this share exceeds three quarters.

5. Conclusion

Both life expectancy and expected years of disability-free life had been trending up in the United States for decades until 2010. The resulting need to fund a longer retirement was met by calls to work longer, and the expanding capacity to work longer justified those calls. However, in the last fifteen years, slowing declines in mortality have coincided with negative health trends, raising the possibility of *even slower* growth in working life expectancy, relative to survival, over the same period. A crucial question, then, is whether working longer is even possible for many people?

To answer that question, policymakers need to know whether individuals are physically capable of working: are they alive, in the community, and not encumbered by work-limiting disabilities? The analysis presented here shows that improvement in life expectancy has moderated since 2006, while improvement in working life expectancy has slowed even more, such that every year of life expectancy gained is associated with only about half a year of work capacity.

Notably, the analysis does not include the COVID-19 pandemic. While the pandemic has been devastating for U.S. life expectancy (Andrasfey and Goldman, 2021), at least on the disability front evidence is more mixed. Owen *et al.* (forthcoming) and Goda *et al.* (2022) both find evidence of reduction in Social Security Disability Insurance (SSDI) during the pandemic with possible reasons ranging from the negative (extended Social Security office closures) to the positive (more flexible work-from-home policy being a helpful accommodation for some people with disabilities). In total, because of these conflicting patterns it is unclear how the pandemic might influence working life expectancy trends going forward.

When looking across demographic groups, the picture is more concerning. The population-level gain, however modest, is driven almost entirely by high-education groups (although low-education Black women have seen similar growth, albeit starting from a lower level and remaining lower than low-education White women). As a result, a large share of those with less than median education will not be able to work even two years beyond the early eligibility age for Social Security, even if they managed to work to 62. This problem is particularly acute among low-education Black men, who had very low working life expectancies in 2006 and experienced no improvement in the past fifteen years. A majority of this group will be incapable of working to the FRA.

It is worth considering the role that SSDI plays in permitting those with severe health limitations to cease working. SSDI provides insurance against loss of earning capacity, which is particularly important for low-earners who are more likely to suffer disabling conditions and for whom SSDI provides higher replacement rates. This insurance helps those who should work longer but cannot because of health impairment. Nevertheless, the call to work longer is broad, and policymakers have long called for DI rolls to be reduced, in part by a return to work of current SSDI beneficiaries.[21]

In thinking of solutions for inadequate retirement savings, working longer may be a fine response for those with more education, but Black and low-education individuals, who are the least likely to have sufficient savings, are also the least well-positioned to work longer.[22] They would also be the groups most vulnerable to further increases in Social Security's eligibility age thresholds. New solutions for these groups need to account for their high probability of not being physically capable of extending their working lives.

[21]Furthermore, the administrative hurdles to obtaining SSDI mean that it provides only partial insurance against earnings losses in the near term (the time between application and benefit receipt is 14.1 months on average, with nearly half of applicants waiting over 28 months for final decisions, Autor *et al.* 2015). And, for those dependent on their employer for health insurance, SSDI only begins to provide Medicare coverage two years after disability onset, which may force people to keep working despite significant health impairments at older ages (see Wettstein, 2020, for evidence of job lock from waiting to receive Medicare Part D).

[22]Munnell *et al.* (2018*a*).

Acknowledgements. The research reported herein was pursuant to a grant from the U.S. Social Security Administration (SSA) funded as part of the Retirement and Disability Research Consortium. The findings and conclusions expressed are solely those of the authors and do not represent the views of SSA, any agency of the federal government, or Boston College. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of the contents of this report. Reference herein to any specific commercial product, process or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply endorsement, recommendation or favoring by the United States Government or any agency thereof.

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Appendix

Appendix Tables A1–A13.

Table A1. Period and cohort life expectancy at age 50 for males, 2006–2018

Year	Period LE	Cohort LE
2006	28.59	30.81
2010	29.33	31.11
2014	29.66	31.40
2018	29.77	31.73

Sources: Authors' calculations using *American Community Survey* (ACS) (2006–2018) and *National Vital Statistics System* (NVSS) (2006–2018).

Table A2. Period and cohort life expectancy at age 50 for females, 2006–2018

Year	Period LE	Cohort LE
2006	32.52	34.55
2010	33.03	34.85
2014	33.38	35.13
2018	33.56	35.41

Sources: Authors' calculations using *American Community Survey* (ACS) (2006–2018) and *National Vital Statistics System* (NVSS) (2006–2018).

Table A3. Percentage of male population institutionalized

Age group	2006	2010	2014	2018
50–54	1.26% (0.0003)	1.55% (0.0004)	1.75% (0.0004)	1.76% (0.0004)
55–69	1.04% (0.0003)	1.17% (0.0003)	1.39% (0.0003)	1.54% (0.0004)
60–64	1.00% (0.0004)	1.02% (0.0003)	1.07% (0.0003)	1.27% (0.0003)
65–69	1.23% (0.0005)	1.06% (0.0004)	1.17% (0.0004)	1.26% (0.0004)
70–74	1.60% (0.0006)	1.37% (0.0005)	1.39% (0.0005)	1.37% (0.0004)
75–79	2.65% (0.0008)	2.05% (0.0007)	1.77% (0.0006)	1.95% (0.0006)
80–84	4.52% (0.0013)	3.50% (0.0011)	3.16% (0.0010)	2.78% (0.0009)

Source: Authors' calculations using ACS (2006–2018).

Table A4. Percentage of female population institutionalized

Age group	2006	2010	2014	2018
50–54	0.30% (0.0002)	0.28% (0.0002)	0.29% (0.0002)	0.33% (0.0002)
55–69	0.39% (0.0002)	0.32% (0.0002)	0.36% (0.0002)	0.33% (0.0002)
60–64	0.61% (0.0003)	0.50% (0.0002)	0.51% (0.0002)	0.49% (0.0002)
65–69	0.93% (0.0004)	0.72% (0.0003)	0.79% (0.0003)	0.73% (0.0003)
70–74	1.70% (0.0005)	1.43% (0.0005)	1.31% (0.0004)	1.22% (0.0004)
75–79	3.49% (0.0008)	2.53% (0.0007)	2.51% (0.0007)	1.87% (0.0005)
80–84	6.93% (0.0013)	5.23% (0.0011)	4.48% (0.0010)	4.15% (0.0010)

Source: Authors' calculations using ACS (2006–2018).

Table A5. Percentage of non-institutionalized male population with limitation of activity

Age group	2006	2010	2014	2018
50–54	14.90% (0.0072)	13.50% (0.0063)	14.19% (0.0057)	14.49% (0.0073)
55–69	16.96% (0.0083)	17.92% (0.0077)	17.64% (0.0065)	19.41% (0.0080)
60–64	22.94% (0.0107)	23.52% (0.0091)	21.73% (0.0075)	21.85% (0.0086)
65–69	21.49% (0.0118)	23.25% (0.0106)	24.94% (0.0088)	23.77% (0.0092)
70–74	27.09% (0.0150)	25.54% (0.0133)	25.64% (0.0104)	28.32% (0.0115)
75–79	31.93% (0.0168)	30.65% (0.0157)	28.64% (0.0129)	30.39% (0.0142)
80–84	40.70% (0.0230)	39.38% (0.0205)	38.54% (0.0176)	43.05% (0.0204)

Source: Authors' calculations using *National Health Interview Survey* (NHIS) (2006–2018).

Table A6. Percentage of non-institutionalized female population with limitation of activity

Age group	2006	2010	2014	2018
50–54	15.80% (0.0071)	16.00% (0.0065)	15.05% (0.0055)	15.24% (0.0072)
55–69	20.23% (0.0085)	21.77% (0.0078)	20.59% (0.0065)	20.21% (0.0078)
60–64	22.74% (0.0102)	23.49% (0.0085)	23.08% (0.0073)	23.06% (0.0083)
65–69	23.47% (0.0113)	24.74% (0.0102)	24.77% (0.0081)	23.97% (0.0089)
70–74	30.93% (0.0138)	28.91% (0.0123)	27.19% (0.0098)	28.79% (0.0106)
75–79	32.86% (0.0155)	37.91% (0.0147)	33.35% (0.0120)	36.66% (0.0138)
80–84	41.80% (0.0187)	41.97% (0.0170)	47.85% (0.0151)	43.98% (0.0171)

Source: Authors' calculations using *National Health Interview Survey* (NHIS) (2006–2018).

Table A7. Percentage of the non-institutionalized male population ages 50–64 with limitation of activity, by race and education group

	White		Black	
Year	Below median	Above median	Below median	Above median
2006	23.4% (0.0100)	12.6% (0.0070)	30.7% (0.0259)	19.3% (0.0185)
2010	23.5% (0.0093)	13.0% (0.0064)	31.1% (0.0215)	22.0% (0.0169)
2018	24.6% (0.0094)	13.5% (0.0063)	36.9% (0.0271)	22.0% (0.0215)

Source: Authors' calculations using NHIS (2000–2018).

Table A8. Percentage of the non-institutionalized female population ages 50–64 with limitation of activity, by race and education group

	White		Black	
Year	Below median	Above median	Below median	Above median
2006	24.6% (0.0103)	14.5% (0.0072)	30.1% (0.0205)	17.2% (0.0164)
2010	24.7% (0.0092)	16.0% (0.0069)	32.3% (0.0185)	22.1% (0.0155)
2018	24.8% (0.0092)	15.7% (0.0065)	33.9% (0.0242)	19.4% (0.0176)

Source: Authors' calculations using NHIS (2000–2018).

Table A9. Average age of respondents age 50–64 in various NHIS rounds, by gender

	Average age	
Year	Men	Women
2006	56.2	56.3
2010	56.4	56.5
2018	56.9	56.9

Source: Authors' calculations using NHIS (2006–2018).

Table A10. Expectations at age 50 of years spent in various states of health for males

Expectation of life				Change		
	2000	2006	2018	2006–2018	2000–2006	2000–2018
Total	27.00	28.59	29.77	1.18	1.59	2.77
Free of disability	21.55	22.93	23.67	0.73	1.39	2.12
With disability	4.98	5.14	5.59	0.45	0.15	0.61
Institutionalized	0.47	0.52	0.51	−0.01	0.05	0.04

Sources: Authors' calculations using NHIS (2000–2018); ACS (2000–2018); and NVSS (2000–2018).

Table A11. Expectations at age 50 of years spent in various states of health for females

Expectation of life				Change		
	2000	2006	2018	2006–2018	2000–2006	2000–2018
Total	30.98	32.52	33.56	1.04	1.54	2.58
Free of disability	24.23	25.55	26.29	0.74	1.32	2.06
With disability	6.06	6.25	6.78	0.53	0.19	0.72
Institutionalized	0.69	0.72	0.49	−0.23	0.03	−0.20

Sources: Authors' calculations using NHIS (2000–2018); ACS (2000–2018); and NVSS (2000–2018).
Note: Disability is defined using the more restrictive definition, of answering affirmatively one of the following: (1) Does a physical, mental, or emotional problem keep you from working? (2) Are you limited in the kind/amount of work you can do because of your health?

Table A12. Total life expectancy and working life expectancy for males at age 50, by education and race

Year	White		Black	
	Below median	Above median	Below median	Above median
Healthy life expectancy				
2006	20.40	26.13	16.03	20.25
2007	19.92	26.67	14.67	20.68
2008	20.09	26.59	15.67	21.13
2009	19.60	26.65	14.36	22.37
2010	20.57	26.89	16.00	21.42
2011	20.10	26.76	14.70	21.53
2012	20.41	27.04	15.89	21.92
2013	20.57	27.08	16.89	21.87
2014	20.60	27.18	16.68	21.85
2015	20.11	27.53	16.23	23.03
2016	20.26	27.10	16.73	21.01
2017	20.34	27.19	16.13	22.15
2018	20.22	27.59	14.76	20.76

Sources: Authors' calculations using NHIS (2000–2018); ACS (2000–2018); and NVSS (2000–2018).

Table A13. Total life expectancy and working life expectancy for females at age 50, by education and race

Year	White		Black	
	Below median	Above median	Below median	Above median
Healthy life expectancy				
2006	23.44	27.89	18.64	23.75
2007	23.66	27.87	17.38	22.72
2008	22.55	28.47	18.68	23.02
2009	23.52	28.14	18.32	22.99
2010	23.65	27.90	19.74	23.38
2011	23.66	27.71	18.99	23.48
2012	23.81	28.44	19.76	24.46
2013	23.44	28.27	19.92	24.54
2014	23.77	28.77	19.62	23.37
2015	23.04	28.82	19.88	24.97
2016	23.67	28.75	20.39	24.32
2017	23.06	29.02	20.01	23.87
2018	23.29	29.21	19.90	24.47

Sources: Authors' calculations using NHIS (2000–2018); ACS (2000–2018); and NVSS (2000–2018).
Note: Disability is defined using the more restrictive definition, of answering affirmatively one of the following: (1) Does a physical, mental, or emotional problem keep you from working? (2) Are you limited in the kind/amount of work you can do because of your health?.

Cite this article: Quinby LD, Wettstein G (2024). Are older workers capable of working longer? *Journal of Pension Economics and Finance* **23**, 165–182. https://doi.org/10.1017/S1474747223000033