Recessions, Job Loss, and Mortality Among Older US Adults

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Objectives. We analyzed how recessions and job loss jointly shape mortality risks among older US adults.

Methods. We used data for 50 states from the Health and Retirement Study and selected individuals who were employed at ages 45 to 66 years during 1992 to 2011. We assessed whether job loss affects mortality risks, whether recessions moderate the effect of job loss on mortality, and whether individuals who do and do not experience job loss are differentially affected by recessions.

Results. Compared with individuals not experiencing job loss, mortality risks among individuals losing their job in a recession were strongly elevated (hazard ratio = 1.6; 95% confidence interval = 1.1, 2.3). Job loss during normal times or booms is not associated with mortality. For employed workers, we found a reduction in mortality risks if local labor market conditions were depressed, but this result was not consistent across different model specifications.

Conclusions. Recessions increase mortality risks among older US adults who experience job loss. Health professionals and policymakers should target resources to this group during recessions. Future research should clarify which health conditions are affected by job loss during recessions and whether access to health care following job loss moderates this relation. (*Am J Public Health.* 2014;104:e126–e134. doi:10.2105/AJPH.2014.302210)

This study addressed 3 gaps in research on the effect of job loss and recessions on mortality risks among older US adults. First, many studies have shown that job loss causes economic strain,[1–4] stress,[5–7] mental illness,[8–12] and cardiovascular disease[13,14] in the US population. However, with notable exceptions,[15,16] few studies have used longitudinal data that are representative of the growing population of older US adults still active on the labor market to determine whether job loss has adverse mortality effects. Second, whether recessions exacerbate or mitigate the effect of job loss on mortality among older workers is unclear. Research on European countries has yielded inconsistent findings, and direct evidence for the United States is lacking. Third, although many studies have examined the effect of the business cycle on mortality rates at the aggregate level, questions remain about how recent recessions have affected mortality rates among older workers, what role labor market mechanisms play, and whether individuals who lose their job and those who remain employed are differentially affected.

Few studies have examined the effect of job loss on mortality among older workers in the United States. Available evidence finds effects for the general population,[15–17] but 2 studies showed that effects were weaker among older workers.[15,18] Research focusing on older workers was based on cross-sectional comparisons between employed and unemployed workers.[15] We contribute to this literature by using longitudinal data representative of the US population aged 50 years or older. We tested whether involuntary job loss had a causal effect on mortality and whether this effect varied over the business cycle. We used an extensive list of demographic, socioeconomic, and health-related covariates to test whether our effect estimates were sensitive to the inclusion of these controls and performed numerous other robustness checks to rule out confounding.

We expected that recessions would magnify the adverse effect of job loss on mortality. Individuals losing their job during recessions face lower reemployment prospects, because more jobless workers compete for fewer job openings.[2,19] This mismatch between job seekers and vacancies results in longer unemployment spells and, if a new job is found, worse job quality, including lower earnings and increased risk of involuntary part-time employment.[2,19–21] Compared with younger workers, older workers generally have greater difficulties finding reemployment and replacing lost earnings and savings.[22–24] Moreover, recessions also force some older workers via unemployment into early retirement,[25,26] permanently lowering their chances of reemployment and recouping lost earnings. Job loss and recessions therefore raise risks of a permanently lowered standard of living among older workers.[27,28] The shock to liquidity and social status that job loss entails triggers both immediate and chronic stress and mental health problems, which result in elevated risks of death from cardiovascular disease and suicide.[13,14,29] Because recessions increase the risk that job loss leads to permanent scars of individual economic and social status, we expected the mortality effect of job loss to be more severe during recessions.[18,27,30,31]

Our primary hypothesis contrasts with influential studies by Martikainen et al.,[32,33] who examined the effect of job loss on mortality in Finland and found weaker effects of job loss during recessions compared with boom years. Studies from other European countries generally have not confirmed the Finnish results.[34–36] European studies may not be informative for the United States, which lacks generous welfare state institutions that protect unemployed workers in European countries.[3,4,12,17,37–39] Because the safety net for unemployed workers is particularly weak in the United States, we expected the consequences of job loss during recessions to be especially severe. Related research on the United States yielded disparate findings. Two studies testing whether contextual unemployment moderated the effect of job loss on mortality among men reached opposing results.[31,40] Studies also disagree on whether high contextual unemployment rates exacerbate the negative effect of job loss on mental health[41,42] or mitigate it.[43] Other studies found no evidence of effect moderation.[44–46] None of these studies explicitly addressed older workers.

Related literature has analyzed the effect of recessions on mortality at the aggregate level.[47–52] Initial studies found evidence of lower mortality rates during recessions,[47,53] but more recent work found no association between aggregate unemployment and mortality rates among US adults aged 45 to 64 years in recent recessions.[49,50] However, it remains unclear what role individual labor market transitions play.[18,50,54,55]

In summary, it is unclear whether there is a causal effect of job loss on mortality among older US workers, whether this effect is stronger or weaker during recessions, and whether recessions differentially affect individuals who lose their job and those who remain employed.

We used data from the Health and Retirement Study to study mortality in a representative sample of older US adults who were at risk for job loss during the observation period (1992–2011). Our analysis sample included 9284 employed individuals aged 45 to 66 years, of whom 1652 experienced job loss resulting from layoff or business closure. We operationalized the business cycle as local labor demand, which we measured with the first principal component extracted from 4 unemployment rate series. We exploited variation in labor demand across local labor markets and over time to test whether the effect of job loss on mortality was particularly hazardous during recessions. We also analyzed individuals who did and did not experience job loss separately to test whether these groups are differentially affected by recessions. We observed periods of extremely low labor demand (i.e., recessionary local labor demand conditions) in 1992 to 1994 and 2009 to 2011. Because follow-up from the 2009 to 2011 period is still too short, our identifying variation for the effects of recessionary local labor demand was from the years 1992 to 1994.

METHODS

We used waves A through M (1992–2011) of the Health and Retirement Study, a multicohort panel survey representative of the US population aged 50 years or older. The study records individual data on labor market outcomes, health, and mortality every 2 years.[56] We restricted the sample to individuals who have been employed and were therefore at risk for job loss at some point during the observation period (we excluded the never employed and the self-employed). We also excluded marginal employment that was unlikely to be an important source of earnings and social status (employment spells of less than 12 months, jobs with zero earnings, jobs with less than 36 weeks of work per year or less than 16 hours of work per week).[13,14,18]

We classified individuals as treated if they experienced job loss resulting from layoff or firm closure between age 45 years and their cohort-specific full retirement age. We classified individuals as control participants if they were employed and therefore at risk for job loss but did not experience job loss during the observation period. To establish a common age range over which individuals were compared, we dropped control employment spells that ended before age 45 years and control employment spells that started after the individual's full retirement age. If individuals had multiple job losses from eligible employment spells, we selected the first spell. Thus, our analysis sample was 9284 individuals, of whom 1652 (18%) experienced job loss. Our outcome was all-cause mortality, and we observed 1284 deaths. (Table A, available as a supplement to the online version of this article at http://www.ajph.org, contains additional information on the analysis sample.)

We operationalized the business cycle as local labor demand, which is the central contextual determinant of reemployment opportunities after job loss. We measured local labor demand by using unemployment rates that

TABLE 1—Aggregate US Unemployment Rates, Recessionary Local Labor Market Conditions (Q6), and Job Losses Among Respondents in the Analysis Sample: Health and Retirement Study, 1992–2011

Year	Unemployment Rate Among Those Aged 45–66 Years, %	% of Respondents per Year Observed in Recessionary Conditions (Q6)	No. of Job Losses	No. of Job Losses in Recessionary Conditions (Q6)
1992	5.5	84.2	57	52
1993	5.2	49.2	160	82
1994	4.1	9.7	148	19
1995	3.5	2.9	122	1
1996	3.4	2.8	99	
1997	3.0	2.7	93	
1998	2.7	2.3	83	
1999	2.6	2.0	96	
2000	2.5	2.0	79	
2001	3.1	1.9	84	
2002	4.0	2.0	83	
2003	4.1	2.1	65	1
2004	3.8	1.8	51	
2005	3.5	1.6	95	
2006	3.1	1.5	62	
2007	3.2	1.5	62	
2008	3.9	1.5	72	
2009	6.9	71.1	97	87
2010	7.5	79.6	36	34
2011	7.3	63.6[a]	5[a]	5[a]

Note. The unemployment rate for those aged 45–66 years was calculated from the Current Population Survey. The correlation between unemployment rate and the indicator for recessionary local labor market conditions was 0.93. The total number of job losses was 1652, with 281 (17%) occurring under recessionary conditions. Local labor demand is measured by the score of the first principal component extracted from 4 unemployment series. The score was converted into 6 quantiles, with the sixth quantile (Q6) capturing recessionary local labor demand conditions.

[a]Among respondents interviewed in the most recent wave M (2010) included in the analysis, 75% of interviews were conducted in 2010 and 25% in 2011.

TABLE 2—Characteristics of US Respondents Who Were Employed at Ages 45 to 66 Years in Analysis Sample by Treatment Status: Health and Retirement Study, 1992–2011

	All (1), % or Mean[a]	Mean Job Losers (2), % or Mean[a]	Mean Non–Job Losers (3), % or Mean[a]	(2) – (3)
Business cycle				
Q1 = boom	25.1	20.3	26.3	-6.0
Q2	18.3	14.3	19.2	-4.9
Q3	15.0	12.9	15.4	-2.5
Q4	14.6	17.0	14.1	2.9
Q5	13.7	20.9	12.0	8.9
Q6 = recession	13.3	14.6	13.0	1.6
Birth year				
1919–1930	2.6	0.6	3.1	-2.5
1931–1935	21.6	15.5	23.0	-7.5
1936–1940	32.4	34.4	32.0	2.4
1941–1945	21.3	25.6	20.3	5.3
1946–1950	13.4	16.1	12.7	3.4
1951–1955	6.6	6.1	6.8	-0.7
1956–1966	2.1	1.8	2.2	-0.4
First interview year				
1992–1997	76.4	76.9	76.3	0.6
1998–2003	14.8	15.7	14.6	1.1
2004–2008	8.8	7.5	9.2	-1.7
Average age at first interview, y	53.7	52.8	54.0	-1.2
Female	45.0	44.5	45.1	-0.6
Race/ethnicity				
White	74.6	74.8	74.5	0.3
Black	15.4	13.1	15.9	-2.8
Hispanic	8.4	9.9	8.1	1.8
Other, NA	1.7	2.2	1.5	0.7
Place of birth				
New England	4.6	5.1	4.5	0.6
Mid-Atlantic	14.4	14.9	14.3	0.6
East North Central	17.3	17.7	17.2	0.5
West North Central	10.1	7.8	10.6	-2.8
South Atlantic	17.1	17.0	17.1	-0.1
East South Central	9.0	8.9	9.1	-0.2
West South Central	9.3	8.2	9.5	-1.3
Mountain	3.3	3.1	3.3	-0.2
Pacific	5.7	6.3	5.5	0.8
Outside United States	9.2	10.9	8.8	2.1
Parental education				
< high school	43.4	43.9	43.3	0.6
High school	32.7	33.3	32.6	0.7
> high school	19.0	17.0	19.5	-2.5
Missing	4.9	5.8	4.7	1.1

Continued

have been the standard measure of the business cycle in previous research.[31,43,47,49,50,52,55] A distinctive feature of our analysis was that we used 4 different unemployment rates that contribute unique geographic, temporal, and demographic information on local reemployment opportunities for older workers. Specifically, we used annual county unemployment rates (available for the entire active workforce only; US Bureau of Labor Statistics); annual commuting zone unemployment rates (US Bureau of Labor Statistics); monthly state-level unemployment rates among those aged 45 to 66 years (Current Population Survey, seasonally adjusted); and monthly state-level unemployment rates among the active workforce (Current Population Survey). Commuting zones are regional aggregates of counties based on commuting patterns that better capture the economic area defining individual economic opportunities.[57] All unemployment rates were demeaned and detrended to isolate cyclical variation (i.e., we used the residuals from a regression of the respective variable on geographic unit fixed effects and unit-specific linear trends). Our unemployment rate data set includes data for 50 states and 3145 counties from January 1992 to December 2011.

Because these 4 measures are highly collinear and represent different facets of local labor demand for older workers, we used principal component analysis to reduce the number of variables in the analyses and combined information from the 4 series into 1 indicator of local labor demand for older workers. We used the first principal component (eigenvalue = 3.4), which explains 86% of the total variation in the 4 variables. (For Tables C–E, available as supplements to the online version of this article at http://www.ajph.org, we repeated the main analyses reported in the following section by using the individual unemployment rate series rather than their principal component.) Although our main conclusions hold regardless of the indicator used, we prefer the indicator based on the principal component score, because it yielded larger, more precise, and more consistent effect estimates.

Because we observed the main and moderating effect of local labor demand to be nonlinear, we split the indicator of local labor demand into 6 quantiles. (Figure A, available as a supplement to the online version of this

TABLE 2—*Continued*

Own education				
< high school	16.2	18.5	15.7	2.8
General equivalency diploma	5.2	7.1	4.7	2.4
High school	50.3	52.9	49.7	3.2
Some college	5.1	4.6	5.2	-0.6
Bachelor's degree	12.8	11.9	13.0	-1.1
Postgraduate	10.4	5.1	11.7	-6.6
Average weeks employed/y	50.7	51.3	50.5	0.8
Average hours worked/wk	41.1	41.1	41.1	0.0
Individual earnings				
Q1	20.0	24.0	19.1	4.9
Q2	20.2	23.8	19.4	4.4
Q3	19.8	19.8	19.8	0.0
Q4	20.0	15.9	21.0	-5.1
Q5	20.0	16.5	20.8	-4.3
Household wealth				
Q1	26.2	29.9	25.3	4.6
Q2	13.8	15.1	13.5	1.6
Q3	20.0	18.6	20.3	-1.7
Q4	20.0	18.3	20.4	-2.1
Q5	20.0	18.1	20.4	-2.3
Household income				
Q1	20.0	24.4	19.0	5.4
Q2	20.0	21.9	19.6	2.3
Q3	20.0	20.0	20.0	0.0
Q4	20.0	17.5	20.6	-3.1
Q5	20.0	16.2	20.9	-4.7
Health insurance coverage				
None	10.6	17.1	9.1	8.0
Any	88.6	81.9	90.2	-8.3
Missing	0.8	1.0	0.8	0.2
Marital status				
Married, partnered	79.2	77.5	79.5	-2.0
Divorced, separated	12.9	14.8	12.5	2.3
Widowed	4.7	4.7	4.7	0.0
Never married	3.2	3.0	3.3	-0.3
Body mass index				
Q1	20.0	17.9	20.5	-2.6
Q2	20.7	19.9	20.9	-1.0
Q3	19.5	18.9	19.7	-0.8
Q4	19.5	20.1	19.4	0.7
Q5	19.6	22.1	19.0	3.1
Missing	0.7	1.1	0.6	0.5
No. of drinks/d				
0	42.4	43.8	42.1	1.7
< 1	34.7	31.8	35.4	-3.6
1–2	16.1	16.5	16.0	0.5
3–4	5.0	5.7	4.8	0.9
> 4	1.8	2.2	1.7	0.5

Continued

article at http://www.ajph.org, summarizes the distribution of the unemployment measures within each quantile.) Job losses in labor markets falling into the fifth (second to highest) quantile (Q5) occurred under labor market conditions still close to the detrended historical mean for 1992 to 2011. Job losses in the sixth (highest) quantile (Q6) occurred at 2.4 percentage points above the demeaned and detrended historical mean unemployment rates, similar to conditions experienced by those who lost their jobs during the Great Recession (2007–2009).

Table 1 lists the incidence of job losses and recessionary labor market conditions (Q6) by year. Recessionary conditions (Q6) were observed in 1992 to 1994 and 2009 to 2011. The identifying variation for the interaction between job loss and recessionary labor market conditions thus came from job losses that occurred during 1992 to 1994, because the follow-up period from job losses during the Great Recession is too short. To test whether compositional difference among workers observed in different years are confounded with local labor market conditions, we also tested whether our results are robust to the inclusion of year fixed effects, which we find to be the case (see Results).

We model time in months from entry into survey to death or censoring in a discrete time framework using complementary log-log regression. The exponentiated parameter estimates have a hazard ratio interpretation.[58] To adjust for variation in the baseline mortality hazard, we controlled for time at risk with nineteen 12-month period dummies. Job loss and labor demand indicators were specified as monthly, time-varying variables. For individuals experiencing job loss, the labor demand indicators remained fixed at the value in the month job loss occurred for the remainder of the observation period, because we expected that job loss would cause a persistent increase in mortality risks.

A central challenge for the analysis was that comparisons of individuals experiencing and not experiencing job loss were potentially biased by unobserved confounders.[18,59–61] The information available in the Health and Retirement Study allowed us to adjust for an extensive list of demographic, socioeconomic, behavioral risk, and morbidity factors to assess

TABLE 2—*Continued*

Ever smoked	60.6	64.4	59.7	4.7
Current smoker	24.5	30.3	23.2	7.1
Self-rated memory				
Excellent	18.0	16.8	18.2	-1.4
Very good	37.4	35.7	37.8	-2.1
Good	32.3	33.9	32.0	1.9
Fair	9.7	10.6	9.5	1.1
Poor	1.3	2.0	1.2	0.8
Missing	1.3	1.1	1.3	-0.2
Ever diagnosed with				
Cancer	4.3	4.1	4.4	-0.3
Diabetes	7.1	6.6	7.2	-0.6
Heart problems	7.0	6.3	7.2	-0.9
High blood pressure	30.2	28.4	30.6	-2.2
Stroke	1.1	1.4	1.0	0.4
Heart attack	2.4	1.9	2.6	-0.7
No. of depressive symptoms				
0–2	89.7	87.0	90.3	-3.3
3–5	7.3	9.0	6.9	2.1
6–8	2.0	3.0	1.8	1.2
Missing	1.0	1.0	1.0	0.0
Self-reported health				
Excellent	25.5	22.2	26.2	-4.0
Very good	32.8	32.9	32.8	0.1
Good	30.1	32.4	29.5	2.9
Fair	10.1	10.8	10.0	0.8
Poor	1.5	1.7	1.4	0.3

[a]Numbers in table are sample percentages unless otherwise noted.

whether unadjusted comparisons were sensitive to the inclusion of these controls, which we found not to be the case.

One typically unobserved or poorly measured cause of job loss was low productivity. Our baseline model controlled for predictors of productivity, including standard demographics, an age cubic, and parental and own education. In a separate step, we added further control variables that were on the causal path from productivity to mortality to block a noncausal association between job loss and mortality: household wealth, household income, individual earnings, health insurance coverage, hours worked, weeks worked, and marital status. All monetary quantities were adjusted for inflation with the Consumer Price Index for All Urban Consumers (Bureau of Labor Statistics). Household wealth and income were equivalized by dividing by the square root of the number of household members. We also controlled for numerous behavioral risk factors and morbidity indicators to block any noncausal association between job loss and mortality attributable to health selection: body mass index (defined as weight in kilograms divided by the square of height in meters); number of alcoholic drinks per day; current smoking; ever smoking; self-rated depression symptoms; self-rated health; self-rated cognitive function; and ever diagnosis of cancer, diabetes, heart problems, high blood pressure, heart attack, or stroke (Table 2). Covariates were measured either at baseline or at the first interview in which respondents were observed in an eligible employment spell.

We also adjusted for state fixed effects, year fixed effects, and census-division linear trends.[47,50] These variables capture unobserved geographic differences and unobserved changes over time in predictors of mortality such as innovations in medical care that could be confounding the business cycle estimates. We also ran models replacing the state fixed effects with county fixed effects and again found consistent results.

We performed 2 types of analysis. First, we assessed whether recessions moderated the effect of job loss on mortality. This regression included a dummy variable for job loss, indicator variables for the labor demand quantiles, and interactions between job loss dummy and labor demand indicators (Table 3). Second, we split the sample into treated and control participants to estimate whether the local labor demand indicators had an effect on mortality in the respective subsamples (Table 3).

RESULTS

Baseline characteristics differed between individuals who experienced and those who did not experience job loss (Table 2). Those who lost their jobs were younger; had lower levels of education, earnings, household wealth, and income; were less likely to have health insurance coverage; were less likely to be married and more likely to be divorced; were more likely to be smokers; had higher body mass index; were less likely to report preexisting health conditions; were more likely to report depressive symptoms; and were less likely to report excellent health. These differences suggest adverse selection into job loss.[32,60,61] However, the magnitudes of the differences were small.

Table 3 reports the main results. The top section reports estimates of the effect of job loss in each of the 6 labor demand quantiles relative to staying employed. The underlying coefficient estimates are reported in Table B (available as a supplement to the online version of this article at http://www.ajph.org). Model 1 controled for the baseline hazard, an age cubic, and demographic characteristics fixed at birth or entry into the survey (birth cohort, year of first interview, gender, race/ethnicity, parental education, own education). Model 2 added state fixed effects, year fixed effects, and census-division linear trends. Model 3 added socioeconomic, behavioral risk, and health variables (adding controls in a stepwise manner did not alter the results). Hazard ratio estimates from the baseline models (model 1) are shown in Figure 1.

TABLE 3—Effect of Job Loss and Business Cycle on Mortality Hazard in US Respondents Who Were Employed at Ages 45 to 66 Years: Health and Retirement Study, 1992–2011

	Model 1 (Baseline), Exp(b) (95% CI)	Model 2,[a] Exp(b) (95% CI)	Model 3,[b] Exp(b) (95% CI)
Full sample (9284 individuals; 1284 deaths)			
Individuals not experiencing job loss (Ref)	1.00	1.00	1.00
Q1 = boom	0.77 (0.52, 1.15)	0.70 (0.47, 1.06)	0.70 (0.46, 1.06)
Q2	0.93 (0.61, 1.43)	0.87 (0.56, 1.34)	0.90 (0.58, 1.39)
Q3	0.98 (0.65, 1.47)	0.91 (0.60, 1.39)	0.77 (0.50, 1.17)
Q4	1.15 (0.80, 1.65)	1.13 (0.78, 1.63)	1.12 (0.77, 1.63)
Q5	1.18 (0.81, 1.70)	1.23 (0.84, 1.80)	0.99 (0.67, 1.47)
Q6 = recession	1.64** (1.14, 2.34)	1.74** (1.18, 2.56)	1.59* (1.08, 2.34)
Model *df*	60	126	176
Individuals experiencing job loss (1652 individuals; 217 deaths)			
Q1 = boom (Ref)	1.00	1.00	1.00
Q2	1.03 (0.58, 1.80)	1.16 (0.65, 2.09)	1.28 (0.70, 2.35)
Q3	1.23 (0.72, 2.12)	1.47 (0.83, 2.58)	1.24 (0.69, 2.25)
Q4	1.41 (0.86, 2.33)	1.66 (0.97, 2.82)	1.61 (0.92, 2.84)
Q5	1.52 (0.93, 2.50)	1.75* (1.03, 2.96)	1.24 (0.71, 2.19)
Q6 = recession	2.20** (1.32, 3.66)	2.63*** (1.54, 4.49)	2.11** (1.20, 3.73)
Model *df*	52	113	160
Individuals not experiencing job loss (7632 individuals; 1067 deaths)			
Q1 = boom (Ref)	1.00	1.00	1.00
Q2	0.94 (0.78, 1.13)	0.88 (0.73, 1.07)	0.88 (0.73, 1.07)
Q3	0.97 (0.79, 1.20)	0.87 (0.69, 1.09)	0.87 (0.69, 1.10)
Q4	0.87 (0.68, 1.11)	0.76* (0.58, 1.00)	0.76 (0.58, 1.00)
Q5	0.86 (0.64, 1.16)	0.64* (0.44, 0.93)	0.65* (0.45, 0.95)
Q6 = recession	1.01 (0.73, 1.38)	0.65 (0.37, 1.15)	0.67 (0.38, 1.17)
Model *df*	54	118	168

Note. CI = confidence interval; Exp(b) = exponentiated coefficient estimates from complementary log-log regression. The business cycle is modeled by 6 quantiles (Q1–Q6) of the first principal component score extracted from 4 unemployment rate variables. The baseline model adjusts for the baseline hazard, age cubic, birth cohort, year of first interview, gender, race/ethnicity, birthplace, parental education, and own education. Socioeconomic characteristics: household wealth, household income, individual earnings, weeks worked, hours worked, health insurance coverage, and marital status. Behavioral risk factors: body mass index; ever smoked; currently smoking; drinks per day; depressive symptoms; self-rated health; self-rated cognitive function; and ever diagnosed with cancer, diabetes, high blood pressure, heart problems, heart attack, or stroke.

[a]Model 1 + state fixed effects, year fixed effects, and Census-division trends.

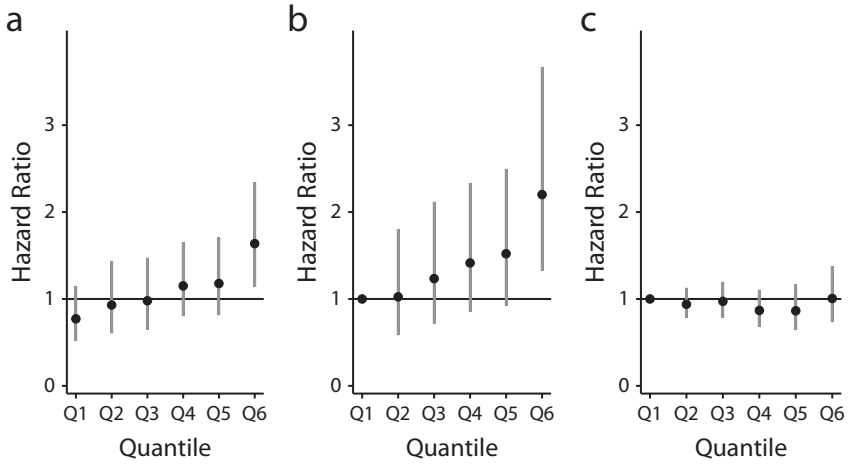
[b]Model 2 + socioeconomic and behavioral risk factors, morbidity indicators.

*$P < .05$;**$P < .01$;***$P < .001$.

In the full sample, no evidence indicated that, on average, job loss or any of the business cycle states were associated with mortality (Table B). After including interactions between job loss and business cycle indicators, there was also no evidence to suggest that job loss had an effect on mortality during normal economic times or booms (Table 3). Hazard ratios were close to 1 and never reached statistical significance. However, job losses during recessionary conditions (Q6) were associated with substantially elevated mortality risks. Compared with individuals not experiencing job loss, mortality risks of individuals losing their jobs during a recession were elevated by a factor of 1.6 (95% confidence interval [CI] = 1.1, 2.4) in the baseline model. These results were robust to the inclusion of extensive controls (models 2 and 3). We found similar effects among men and women. Moreover, we found the effect of displacement resulting from firm closure during recession to be of equal size to the effect of layoff during recession.

Next, we split the sample into control participants and treated participants and estimated the effect of labor demand net of potential confounders. Among the treated participants, we found clear and consistent evidence of countercyclical mortality (Table 3). Mortality hazards increased as the business cycle entered a downturn, with a sharp increase during the worst local labor market conditions (Q6). The estimates were robust to our checks, which also indicated that compositional differences among the treated over business cycle states and years were not driving the interaction effect between recessions and job loss reported in the top section of Table 3.

For individuals at risk for but not experiencing job loss, the results were inconsistent across specifications. In the baseline model, we observed no effect of the business cycle on mortality. Once we adjusted for year fixed effects, we observed protective effects of the



Note. The figure charts hazard ratios (black dots) and 95% confidence interval estimates (gray bars) from the baseline model, which adjusted for a baseline hazard, age cubic, birth cohort, year of first interview, gender, race/ethnicity, parental education, and own education. The business cycle is modeled by 6 quantiles (Q1–Q6) of the first principal component score extracted from 4 unemployment rate variables. Q1 corresponds to local labor market conditions characteristic of booms, whereas Q6 is characteristic of recessions. Reference categories were: full sample, employed; individuals experiencing job loss, Q1; and individuals not experiencing job loss, Q1.

FIGURE 1—Effect of job loss and business cycle states on mortality hazard in US individuals who were employed at ages 45 to 66 years among (a) full sample, (b) individuals experiencing job loss, and (c) individuals not experiencing job loss: Health and Retirement Study, 1992–2011.

business cycle (i.e., lower mortality during recessions among the employed). More precisely, model 2 indicated that employed older workers observed in labor markets where demand was particularly low relative to the annual economy-wide mean had lower mortality risks. This effect was unchanged by the inclusion of numerous predictors of health and employment status, suggesting that the business cycle is exogenous with respect to individual characteristics in this analysis. Drawing on previous work indicating that recessions lower mortality rates, we interpret this finding as supportive of the argument that older employed workers may reduce working hours during recessions (possibly reducing stress and accidents and increasing leisure time).[47,53,62]

A potential explanation for the inconsistent results is that economy-wide downturns increase mortality rates among the employed, whereas working in a labor market in which demand is particularly low relative to the annual economy-wide mean is protective.[47] This protective effect of declining local labor demand may be canceled out by the potentially hazardous effect of declining economy-wide labor demand, yielding no effect of the business cycle in the baseline model (model 1). Once we included year fixed effects, we partialed out the opposing effects of national declines in labor demand and declines in local labor demand relative to the national mean. However, this interpretation is tentative because it assumes that the year fixed effects mainly reflect year-to-year changes in labor demand, while they also pick up any other predictor of mortality unaccounted for by individual covariates that change from year to year.

DISCUSSION

We have analyzed the joint effect of recessions and job loss on mortality in a representative sample of older US adults who were employed from 1992 to 2011. Compared with individuals not experiencing job loss, mortality risks among individuals losing their job in a recession were elevated by a factor of 1.6 (95% CI = 1.1, 2.4). Although previous research found elevated mortality risks among middle-aged and older men affected by mass layoffs in Pennsylvania in the early 1980s recession, we showed that this effect also exists in a representative sample of older US men and women and in a more recent context. However, we also showed that job loss increased mortality risks during recessions only. Consequently, policymakers and health professionals should focus resources on older workers who lose their jobs during recessions.

When we extrapolated our findings, we expected smaller mortality effects of job loss during the Great Recession because of improvements in medical care. However, even though health conditions caused by job loss (e.g., cardiovascular and mental illness) have become more treatable,[63–65] job loss also entails restrictions in care access. Individuals who lost their job during the Great Recession therefore may not have fully benefited from advances in treatment.[65,66] Considering that the labor market downturn was stronger and more persistent during the Great Recession than during the early 1990s recessions,[2,19] on which our estimates were based, we would expect larger mortality effects of job loss during the Great Recession. Altogether, we believe that advances in treatment were unlikely to have eradicated the strong effects we observed, making our estimates of the effect of job loss during recession useful to inform research and debate on the health effect of the Great Recession. Future research needs to clarify which health conditions are affected by job loss during recessions and whether access to health care following job loss moderates this relation.

For individuals at risk for but not experiencing job loss, our estimates indicated either no effect of the business cycle or protective effects for individuals in labor markets where demand was far below the national mean in a given year. This requires further exploration. It is standard practice in economics to identify the effect of the business cycle from local deviations of macroeconomic variables from their economy-wide annual mean.[47–50,53,55,62] This approach may be uninformative about the effect of the business cycle if local and national cyclical variation have different effects on mortality, which has been suggested in other work[47] and which is one possible explanation of our results. Future research should focus on exploring the effect of local and national business cycles theoretically and empirically.

Finally, our results should be evaluated in the context of the comparatively weak US

social safety net. McLeod et al.[17] found stronger effects of unemployment on mortality among less-educated workers in the United States compared with Germany. Other studies on Western European countries also reported weaker, if any, effects of job loss on health and mortality.[32,38,67,68] These cross-national differences suggest that welfare state institutions, such as generous unemployment insurance and universal health care access, could weaken the effect of job loss on health.[17,38,39] Future research should examine whether features of the US safety net have protective health effects and whether these effects vary with the business cycle. ■

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Contributors

C. Noelke conceptualized the study, conducted the analysis, and wrote the article. J. Beckfield helped with conceptualizing the study, interpreting results, and writing the article.

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