Toward a Better Estimation of the Effect of Job Loss on Health*

SARAH A. BURGARD

University of Michigan

JENNIE E. BRAND

University of California–Los Angeles

JAMES S. HOUSE

University of Michigan

Previous research has shown that involuntary job loss may have negative health consequences, but existing analyses have not adequately adjusted for health selection or other confounding factors that could reveal the association to be spurious. Using two large, population-based longitudinal samples of U.S. workers from the Americans' Changing Lives Study and the Wisconsin Longitudinal Study, this analysis goes further by using respondents' self-reports of the reasons for job loss and information about the timing of job losses and acute negative health shocks to distinguish health-related job losses from other involuntary job losses. Results suggest that even after adjustment for numerous social background characteristics and baseline health, involuntary job loss is associated with significantly poorer overall self-rated health and more depressive symptoms. More nuanced analyses reveal that among involuntary job losers, those who lose their jobs for health-related reasons have, not surprisingly, the most precipitous declines in health. Job losses for other reasons have substantive and statistically significant effects on depressive symptoms, while effects on self-rated poor health are relatively small.

The organization of work has changed in the United States and many other industrialized countries, with increasing global economic competition and major shifts in the occupational structure away from traditionally stable jobs in manufacturing and toward more flexible employment arrangements in service occupations (Smith 1997). These shifts entail greater uncertainty for workers from many sectors, and they have been accompanied by an in-

crease in involuntary job loss, independent of the business cycle (Hamermesh 1989; Keltzer 1998). Such changes represent a potential population health problem because a large body of evidence indicates that people who have lost a job or who are not employed have significantly poorer health than their counterparts working for pay (see Dooley, Fielding, and Levi 1996 for a review). Many analysts have argued that job loss harms health because it represents a serious negative life event that has substantial economic consequences, including a lower subsequent probability of employment, considerably reduced wages and earnings in future jobs, and lower levels of employer-offered pension and health insurance (Brand 2004; Farber 2003; Jacobson, LaLonde, and Sullivan 1993). A job loss also represents the loss of a major social role and of contact with social networks on the job (Hayes and Nutman 1981). For such reasons, it has been suggested that poor social and economic conditions resulting from job loss cause health decline.

However, arguments that job loss leads to poor health have been challenged by two major alternative explanations: health selection and other confounding factors. In the case of health selection, people who are less healthy may have a greater likelihood of involuntary job loss, such that poor health causes job loss rather than job loss causing poor health (McDonough and Amick 2001). Alternatively, other confounding factors may put individuals at greater risk of both unstable employment histories and poor health in later life. For example, an individual's family socioeconomic background could influence the likelihood of an involuntary job loss above and beyond his or her own adult socioeconomic position (Brand 2006), as well as affecting the individual's later life health. Thus, models that fail to control for factors such as parents' income may be subject to selection bias. Other potential confounding factors include the characteristics of the job. For instance, a respondent working in the private sector may be at greater risk of both involuntary job loss and poor health care coverage. Failure to take account of these kinds of confounding factors could produce a spurious association between job loss and subsequent health.

Existing studies seeking to link involuntary job loss to declining subsequent health have attempted to address both health selection and other confounding factors, but they have faced some limitations. Most importantly, existing longitudinal studies have used a baseline measure of the health outcome under study to adjust for preexisting poor health, but they have been unable to clarify the ordering of employment changes and health changes that occurred between survey waves. Was involuntary job loss the catalyst for health decline? Or was it the worsening of a preexisting health condition—or an acute negative health shock—that precipitated a job loss? Distinguishing such scenarios is important if we wish to understand the processes that link employment instability and health decline. The goal of the present analysis is to reassess the effect of involuntary job loss on subsequent health, using a more careful specification of health selection than those found in existing studies while also attending to a wide array of other potentially confounding factors.

HOW AND WHY SHOULD JOB LOSS AFFECT HEALTH?

For the purposes of the present analysis, we identify involuntary job loss as discharge from paid employment for any reason when an individual would prefer to keep working. This definition encompasses loss of a job due to a factory closing, relocating, or downsizing; job loss due to layoff or firing; the ending of a temporary or seasonal job; or any other scenario in which a worker did not voluntarily decide to terminate employment. Several research traditions have contributed to our theoretical understanding of the way an involuntary job loss could affect subsequent health. Much research on mental health has focused on the impact of stressful life events; unemployment and job loss were frequently studied within this framework, along with other stressful events that repeatedly have been implicated as causes of poorer mental and physical health (Kasl and Jones 2000; Theorell 1982). However, more recent work has turned from studying the cumulative effects of a "checklist" of life events to a focus on more chronic stressors or on the longer-term effects that arise as a consequence of "acute" events.[1] According to this perspective, an event like involuntary job loss is the precipitating factor that gives rise to a more chronic stress process associated with the ongoing difficulties of unemployment or reemployment, often in a job of inferior quality compared to the one that was lost (House 1987; Pearlin et al. 1981).

Research in social stratification and economics has also explored the social and economic consequences of job displacement, which is job loss that occurs when firms downsize, restructure, close plants, or relocate, or when a worker is not recalled from a layoff. Job displacement is a specific type of involuntary job loss resulting from economic and business conditions largely independent of the individual performance of a worker. However, analyses of job displacement often use data sources such as the Panel Study of Income Dynamics, in which workers who are fired are grouped with workers who are laid off. Thus, in practice the definition of displacement is ultimately broader than its original conceptualization. The findings of job displacement studies likely have implications for studies of the broader category of involuntary job loss. Job displacement typically entails a substantial period of nonemployment (Farber 2003; Podgursky and Swaim 1987), a major loss of income and increased financial strain (Hamermesh 1989; Jacobson et al. 1993; Podgursky and Swaim 1987), and reduced job quality when reemployed (Brand 2006). These consequences appear to have lasting effects on long-term earning potential (Brand 2004; Jacobson et al. 1993; Podgursky and Swaim 1987), and they could reduce an individual's ability to purchase health-promoting goods. Losing a job may also have consequences for both health-related and nonwage economic benefits derived from employment, such as health insurance coverage, pension benefits, and other benefits (Brand 2006; Podgursky and Swaim 1987).

In addition, sociologists and epidemiologists have focused on noneconomic as well as economic mechanisms connecting job loss to health problems. An involuntary job loss could entail the loss of psychosocial assets including goal and meaning in life, social support, sense of control, and time structure (Jahoda 1982; Pearlin et al. 1981). Furthermore, being unemployed is a stigmatized condition, at least in American society, creating a sense of anxiety, insecurity, and shame (Newman 1988). Thus, on balance, an involuntary job loss seems likely to damage health because it represents a serious source of acute stress and immediate disruption to a major social role, as well as potential chronic stress and long-term economic and social consequences. Nevertheless, failure to account for health selection and other confounding factors may upwardly bias estimates of the impact of a job loss on subsequent health.

EVIDENCE REGARDING THE HEALTH CONSEQUENCES OF JOB LOSS

Strong evidence that involuntary job loss negatively affects health comes from studies of factory closures (e.g., Kasl, Gore, and Cobb 1975), one form of job displacement. Such evidence is not likely to be vulnerable to concerns about health selection or the influence of other confounding factors, because when an entire organization closes, it is less likely that a particular worker's specific characteristics are responsible for his or her displacement. Some plant-closure studies have found an increased risk of mental distress and increased physician consultations, illness episodes, and hospital referrals and admittance (Hamilton et al. 1990; Keefe et al. 2002). While plant-closure studies make strong claims for having eliminated the influence of health selection and confounding, results based on a single factory or production industry have limited generalizability to the workforce as a whole.

Studies of involuntary job loss and health that follow longitudinal population-based samples more adequately represent the entire workforce, giving results greater external validity. Though limited in number, existing longitudinal studies have shown that job loss is linked to a greater number of reported medical conditions, higher rates of use of medical services, and higher rates of use of pension disability benefits (Ferrie et al. 1998; Westin 1990), as well as poorer physical functioning (Gallo et al. 2000) and increases in self-reported physical illness (Turner 1995). Other longitudinal studies have also shown that job loss is associated with worsening of psychological symptoms such as depression, somatization, and anxiety (Dooley, Catalano, and Wilson 1994; Gallo et al. 2000; Turner 1995). However, there remains evidence suggesting that health selection may influence the relationship between job loss and health in the population at large. Healthy people are generally more likely to enter employment, while those in poor health are more likely to leave employment (Korpi 2001; Mastekaasa 1996; Waldron 1980). Analyses of population-based samples cannot make the assumption that individuals' characteristics did not influence the job loss, and such analyses typically have only limited baseline controls for health and other

characteristics. Thus, existing longitudinal studies have been unable to assess the complex series of events that lead involuntary job loss and health to intersect between survey waves, and their results have been vulnerable to the criticism that they may be biased by unmeasured selection effects.

In the present study, we assess whether involuntary job loss is associated with subsequent health decline after carefully controlling for health selection and other potentially confounding factors. We consider self-rated poor health and depressive symptoms as outcomes, and we use two complementary, longitudinal, population-based samples followed for periods of 15 to 35 years. One survey is nationally representative, and the other is regionally representative, both including men and women from across the occupational spectrum. In addition to an extensive set of health and social background measures, for one sample we also have information about the reported reasons for involuntary job loss, and in the other we have information about the timing of job-loss events and health shocks (serious or life-threatening illnesses or accidental injuries). Thus, we can better identify individuals for whom baseline health or other confounding factors seem to explain the relationship between their job loss and later health, as well as individuals for whom the job loss was likely due to health problems *not* evident at baseline. By distinguishing these individuals from those for whom the relationship between job loss and subsequent health is unlikely to be spurious, we refine the estimate of the impact of job loss on health.

DATA AND METHODS

We use two complementary data sources: the Americans' Changing Lives study (ACL) and the Wisconsin Longitudinal Study (WLS). The ACL is a longitudinal cohort comprising a stratified, multistage area-probability sample of noninstitutionalized adults 25 years of age and older living in the United States in 1986, with oversampling of adults 60 and older and of African Americans. Weights have been designed to make ACL respondents at each wave representative of the noninstitutionalized adult population in the contiguous United States in 1986. In the baseline survey, face-to-face interviews were conducted with 3,617 men and women (representing 70% of sampled households and 68% of sampled individuals), and

these individuals were contacted for follow-up in subsequent waves of data collection in 1989 (83% of survivors), 1994 (83% of survivors), and 2001/2002 (76–80% of survivors). At each wave of data collection, respondents reported on their current health and were asked about the occurrence and timing of an involuntary job loss or any serious health events in the several years prior to interview. Further information about the longitudinal study design for the ACL can be found elsewhere (House, Lantz, and Herd 2005). We restrict the ACL analytic sample to respondents who were interviewed for the 1989, 1994, or 2001/2002 surveys (3,118 cases), were working for pay in 1986, 1989, or 1994 (2,108 cases), and were not missing information on involuntary job loss experience, health, or other key covariates (1,778 cases).[2]

We use data from the Wisconsin Longitudinal Study to assess the robustness of estimates from the nationally representative ACL sample. The WLS began as a long-term study of a random sample of 10,317 men and women who graduated from Wisconsin high schools in 1957. Data were collected from parents of the respondents in 1964 and from the respondents themselves in 1975 and in 1992/1993. In 1964 and in 1975, the WLS had response rates of 87 percent and 89 percent of survivors, respectively (Sewell et al. 2001). In the 1992/1993 round of data collection, the content was extended to obtain detailed occupational histories and extensive information about mental and physical health and well-being. Information on the occurrence and timing of job losses between 1975 and 1992/1993 was collected, as well as detailed information about the reason for job loss. Out of 9,741 survivors of the original sample, 87 percent completed telephone interviews in 1992, 35 years after the initial data collection. Mail-survey response, conditional on completed telephone interviews, was about 80 percent, or about 70 percent of all survivors. We restrict our analysis to WLS respondents who completed phone and mail interviews for the 1992/1993 survey (8,327 cases), worked at a paid job for six months or longer during the period 1975–1992 (7,972 cases), and were not missing information about the reason for an employment-spell termination or other covariates used in the analyses (7,330 cases).[3]

Measures

Descriptive data—means and standard deviations (in parentheses), or percentages where appropriate—for all measures used in the analysis are presented in Table 1 for the ACL and WLS, separately by job loss history. For the purposes of Table 1, respondents who have had an involuntary job loss at any time over follow-up are included in the category "had job loss." Measures common to both data sets are presented in the top portion of Table 1, with those specific to each data set below. Significance levels of *t*-tests for differences in characteristics across categories of job loss history are presented in the second column for each sample. We present health-outcome measures for eligible respondents in the 2001/2002 wave of the ACL survey and predictors from baseline (1986), but health outcome measures and predictor variables from 1989 and 1994 are also used in the analysis, as outlined below in the analytic strategy section. Measures for the WLS were collected mainly in 1975, while the

health outcome measures refer to health in 1992/1993. Some of the WLS nonhealth measures were retrospective reports that were actually collected from respondents in 1992/1993 but that pertain to a respondent's first job spell over the period 1975–1992. All figures for the ACL presented in Table 1 are weighted estimates; weights are unnecessary for the random sample of WLS respondents, and column totals for each sample are unweighted.

Health outcomes. We use two health measures to compare the effects of an involuntary job loss on physical and mental health. Self-reports of poor health and depressive symptoms were collected at each wave from ACL respondents and in 1992/1993 for WLS respondents. Respondents were asked to rate their overall health at the time of the survey with a standard five-category item for self-rated health, with values ranging from excellent (1) to poor (5). Self-rated health has been shown to be a reliable, valid measure of health, and it is predictive of subsequent functional decline and

TABLE 1. Means or Percentages for Dependent and Independent Variables by Involuntary Job Loss Experience, ACL and WLS

| | Americans' Changing Lives Study | | | | Wisconsin Longitudinal Study | | | |
| | No Job Loss | | Had Job Loss | | No Job Loss | | Had Job Loss | |
Dependent variables	Mean/%	S.D.	Mean/%	S.D.	Mean/%	S.D.	Mean/%	S.D.
Self-rated poor health[a]	2.31	(.940)	2.50	(1.05)	1.80	(.631)	1.97	(.760)***
Depressive symptoms[a,b]	−.367	(.819)	−.181	(.992)***	2.42	(.983)	2.60	(1.01)***
Independent variables								
% Male	50.4	—	54.7	—	49.5	—	46.9	—
Education (years)	13.2	(2.62)	13.2	(2.48)	13.6	(2.28)	13.0	(1.82)***
% Married	74.7	—	67.0	—**	89.0	—	87.9	—
Annual earnings	38,694	(33,197)	40,255	(35,200)	37,297	(41,142)	32,219	(37,530)***
% Private-sector employee	60.7	—	77.8	—***	64.6	—	79.5	—***
% Goods-producing industry	25.4	—	33.2	—**	26.8	—	33.6	—***
Occupational standing	−.754	(1.58)	−.956	(1.38)	.660	(1.36)	.314	(1.20)***
Age at baseline	41.9	(12.2)	37.0	(8.79)***	—	—	—	—
% Black	9.46	—	11.7	—	—	—	—	—
Baseline self-rated health	2.00	(.874)	2.06	(.913)	—	—	—	—
Baseline depressive symptoms	−.146	(.936)	.159	(1.06)***	—	—	—	—
Mother's schooling	—		—		10.5	(2.84)	10.3	(2.78)*
HH's occupational status[c]	—		—		33.0	(21.6)	32.5	(20.6)
Parents' income	—		—		6.33	(.082)	6.33	(.087)
Mental ability	—		—		101.9	(14.7)	100.4	(14.7)***
Labor force experience	—		—		64.4	(28.3)	64.4	(28.9)
Employer tenure	—		—		5.90	(5.78)	4.72	(5.30)***
% With pension	—		—		60.5	—	47.1	—***
% Union member	—		—		23.0	—	19.4	—**
N	1,447		331		5,664		1,666	

* *p* < .05; ** *p* < .01; *** *p* < .001 (two-tailed tests)
Note: All figures for the Americans' Changing Lives study presented in Table 1 are weighted estimates, while weights are unnecessary for the random sample of Wisconsin Longitudinal Study respondents, and column totals for each sample are unweighted.
[a] Health outcome dependent variables presented here measured in 2001/2002 for ACL and in 1992/1993 for WLS.
[b] Depressive symptoms measures not directly comparable across ACL and WLS samples (see article).
[c] HH = Household head of respondent's parental household.

mortality (Idler, Russell, and Davis 2000), despite our limited understanding of the complexities of how individuals rate their health (Schnittker 2005). In the ACL, the average self-rated poor health score in 2001/2002 is 2.3 for workers who did not lose a job and 2.5 for workers who did lose a job, reflecting a score between "very good" and "good" overall health. Respondents in the WLS have average self-rated poor health scores of 1.8 for workers who did not lose a job and 2.0 for workers who did, falling between "excellent" and "very good," and slightly better that those reported by ACL respondents. The difference likely reflects the younger average age at the end of observation for the WLS sample (about 53 vs. 57 years), as well as the higher level of education and largely white racial composition.

Depressive symptoms are measured in both studies using the Center for Epidemiological Studies Depression Scale (CES-D) (Radloff 1977). The full 20-item scale is used for the WLS, while an 11-item subset of the complete scale is used for the ACL. Kohout, Berkman, and Coroni-Huntley (1993) demonstrated that this subset well represents the full scale. In the ACL, responses to each item about how respondents felt in the past week are scored on a three-item Likert-type scale (1 = hardly ever, 2 = some of the time, 3 = most of the time). Standardized scores of all available items are averaged, and the score is then standardized (with all standardization based on the mean and standard deviation of the total 1986 ACL sample), with a final range from –1.2 (least depressed) to 4.7 (most depressed). Surviving ACL respondents interviewed in 2001/2002 reported average CES-D scores of –0.37 for workers who did not lose a job and –0.18 for workers who lost a job. In the WLS, the scoring of individual CES-D index items is based on a count of the number of days in the last week (0–7) that the respondent felt as indicated on each of the 20 items; the items are summed for a total possible range of scores from 0 (least depressed) to 140 (most depressed). We added a small constant to retain those with a raw score of zero and used the natural logarithm of this index to reduce skewness (final range 0 to 4.8). Respondents from the WLS reported average CES-D scores of 2.4 for workers who did not lose a job and 2.6 for workers who lost a job. Because of differences in the way respondents were asked about their depressive symptoms, depressive-symptoms scales for the ACL and WLS were created differently, and values cannot be directly compared across the samples. However, experimentation with a variety of methods of recoding these scales to make them more similar showed results substantively identical to those we report here. The range of scores on the scales used here is very similar across the two samples, making general comparisons of the size of estimated associations more accurate than with any of the other scaling we explored.

Involuntary job loss. At each wave of the ACL, all respondents were asked whether they had "an involuntary job loss for reasons other than retirement" since the last wave of the survey to which they had responded. Thus, ACL respondents decided if the job loss was involuntary, and this exposure measure includes a mixture of job losses that were "truly" involuntary, those that were precipitated by health problems, and potentially some job losses for which the respondent was at fault. To explore the bias that could arise from using this broad, self-defined measure of involuntary job loss in the nationally representative ACL sample, we use more detailed information about reasons for job loss from WLS respondents. Our general strategy is first to construct a measure of involuntary job loss for WLS respondents to match the measure available for ACL respondents, and to estimate a parallel set of models to demonstrate whether the relationship between involuntary job loss and health is similar across the two samples. Then we explore distinct reasons for involuntary job loss as predictors of subsequent health among WLS respondents, to compare the impact of health-related job losses with the impact of job losses for a variety of other reasons. In the 1992/1993 wave of the WLS, a detailed employment history was collected from respondents, in which each was asked about termination of employment spells between 1975 and 1992/1993. Using open-ended reports of reasons for termination, a measure of involuntary job loss was created by separating the 1,666 respondents who lost a job into categories of job loss due to plant closing, downsizing, relocating (n = 979); other involuntary termination due to firing or layoff (n = 263); temporary or seasonal layoff (n = 83); health-related reasons (n = 309); business failure (n = 31); or imprisonment (n = 1).

We use a different strategy to isolate health-related job losses among ACL respondents, who were asked at each survey wave whether

and when they had experienced a range of other life events, including a serious or life-threatening health event.[4] These health shocks, typically not captured in longitudinal survey data because they occur between survey waves, may be important drivers of change in health over time, whether they are the cause or consequence of an involuntary job loss or are unrelated to job loss. Because we know the year (and in most cases the month) of the job loss and the health shock, we can create two categories of job loss: (1) likely cases of health selection, where a health shock clearly precedes a job loss, and (2) cases not attributable to health selection, where any health shocks clearly follow the job loss or no health shock is recorded in the interval. There remain 48 cases in which an involuntary job loss and a health shock occur in the same month, or the ordering of events is not distinguishable due to missing information, so we estimate a comparison set of models that assigns these indeterminate cases first to the category of job losses likely due to health selection, and then to the category not attributable to health selection. By comparing the results from these comparison models, we obtain bounds on the estimated contribution of health-related job losses to the overall impact of involuntary job loss on subsequent health. Clearly, the potential for different kinds of misclassification error is present across the variety of methods used here, as it is in most studies of the effect of job loss on health, but using different strategies to identify health selection will illustrate the sensitivity of our findings to measurement differences.

Other predictors. Indicators of the respondent's age and race (black or non-black) are included in all models using the ACL sample; they are not included in models using the WLS because it is an almost entirely white cohort of individuals very similar in age (all high-school graduates in 1957). Many characteristics correlated with both health and involuntary job loss are also included in the analyses, including the following: sex, educational attainment (years of completed schooling), marital status (currently married or not), respondent's annual earnings (adjusted to 2004 dollars), whether the respondent works for a private or public employer, employment in a goods-producing industry (manufacturing, mining, or construction) or not, and occupational status (occupational education score, based on the respondent's three-digit Census occupation code). We

have recoded annual earnings and occupational status using the started log transformation: a small constant is added to each respondent's earnings ($500) and occupational status score (1 status point) before taking the log of each, so that individuals with a score of zero on the measures are retained. Taken together, these sociodemographic and work characteristics provide a basic outline of the respondent's adult social position. We expect that individuals with higher social position—as indicated by greater educational attainment, higher earnings, and higher occupational standing—will report better health than their counterparts with lower social position. We also expect to find that married people are in better health compared to unmarried people.

In the ACL analyses, adjustments are also made for baseline health status, measures not available in the WLS. However, WLS measures allow further adjustments for social background not available for ACL respondents, including the following: respondent's mother's schooling (years, measured in 1957), head of parental household's occupational status (coded using Duncan's [1970] Socioeconomic Index Score, measured in 1957), parents' income (measured in 1957 and truncated at $99,800, transformed using the started log transformation as described above), respondent's mental ability (Henmon-Nelson 11th grade IQ score), respondent's labor-force experience in 1975 (proportion of time between 1957 and 1975 known to not be out of the civilian labor force), respondent's tenure with current employer as of 1975 (in years), respondent's pension status (whether in first job spell in 1975–1992 employer offered pension/retirement plan), and respondent's union-membership status (indicator of membership in a labor union in first job spell 1975–1992). Labor force experience, job tenure, and union membership are generally included as controls in studies of job displacement (Farber 2003; Podgursky and Swaim 1987). Family background has also been shown to significantly influence the probability of a job displacement, even when controlling for labor market experiences (Brand 2006).

Analytic Strategy

For the multivariate analysis, we created up to three person-spell records per ACL respondent. The first possible spell (1986–1989) contains information about health in 1986 and in

1989, sociodemographic characteristics measured in 1986, and an indicator of whether the respondent involuntarily lost a job between 1986 and 1989 (reported in 1989). The second and third spells capture the same information for the 1989–1994 and 1994–2001/2002 periods. In the analysis, we include indicator variables for the person-spell under observation (1986–1989, 1989–1994, or 1994–2001), noting the number of years in each spell. Using the ACL person-spells it is possible to assess the impact of a past involuntary job loss, retrospectively reported at a given wave, on health status at that same wave, while adjusting for the individual's health and socioeconomic position at an earlier wave, reported prior to the job loss.[5] There were 141 involuntary job losses in the 1986–1989 period, 134 in the 1989–1994 period, and 133 in the 1994–2001/2002 period, for a total of 408 losses. One person-spell was constructed for each WLS respondent, measuring health in 1992/1993, background factors in 1957, 1964, and 1975, an indicator of whether there was an involuntary job loss any time between 1975 and 1992, and the reason for the loss.[6] In the analytic sample for the WLS, 1,666 respondents reported an involuntary job loss at some time between 1975 and 1992/1993.

Throughout the analysis, Stata version 8.0SE software is used. We estimate models separately for the ACL and WLS samples because each sample contains unique predictors, and some measures are coded differently across the samples. We model self-rated poor health and depressive symptoms as continuous outcomes using ordinary least squares multiple regression models, and the ACL analysis includes adjustments for the clustering of multiple observations per individual and robust standard errors. We also estimated ordered probit models for self-assessed overall health, but the results were substantively unchanged, so we report the OLS regression results here for simplicity. In analyses not shown here, we explored models predicting involuntary job loss to identify the characteristics that, if omitted from models predicting health, would likely bias our estimates of the effect of involuntary job loss. Those potentially confounding factors are included in all models predicting health outcomes. We estimate models using pooled samples that contain men and women, adding appropriate interaction terms between respondent's sex and relevant predictor variables.[7] In

exploratory analyses not reported here, we also examined models estimated separately by sex and found that the specification using all statistically significant interaction terms between sex and predictor variables produces substantively similar results.

RESULTS

We now turn to assessing the impact of an involuntary job loss on subsequent health. Results are presented in Table 2 for ACL respondents and Table 3 for WLS respondents, where coefficients represent the estimated difference in health associated with a unit change in the predictor. Estimated coefficients from models of depressive symptoms should not be directly compared across the ACL and WLS samples because of differences in the way this measure was collected and scaled. First, in model 1 we obtain upper-bound estimates of the impact of job loss on self-rated poor health and depressive symptoms, adjusting only for the respondent's sex in the WLS model and for sex, age, black race, and person-spell under observation (1986–1989, 1989–1994, or 1994–2001) in the ACL model, to make the results comparable across samples. In these baseline models, self-rated poor health and depressive symptoms are significantly worse for both ACL and WLS respondents who report a past involuntary job loss.

Next, in model 2 we adjust these upper-bound estimates of the effect of involuntary job loss on health for potential confounding by controlling for basic sociodemographic and work characteristics that are measured equivalently for ACL respondents and their WLS counterparts. With these adjustments, differences in self-rated health and depressive symptoms associated with an involuntary job loss are still statistically significant, though modestly reduced, perhaps more so for self-rated poor health than for depressive symptoms.

With model 3, we move away from parallel models, adjusting for distinct sets of predictors to capitalize on the strengths of each study. For ACL respondents we include measures of self-reported poor health and depressive symptoms collected at the baseline of the person-spell, which are very strong and significant predictors of subsequent health. Not surprisingly, the explained variance rises dramatically in model 3 when baseline health measures are included, compared with the earlier models; but, importantly, health outcomes are still significantly

TABLE 2. Unstandardized Coefficients from Ordinary Least Squares Regression Models of Self-Rated Poor Health or Depressive Symptoms on Involuntary Job Loss and Selected Independent Variables—ACL Respondents

	Self-Rated Poor Health			Depressive Symptoms		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Involuntary job loss	.187**	.152*	.139*	.257***	.221**	.181**
Male	−.008	.005	.005	−.102*	.958	.779*
Age at baseline	.009***	.007***	.005***	−.003	−.007***	−.004**
Years between waves	−.001	.000	−.006*	−.010**	−.007*	−.002
Black	.389***	.344***	.166***	.368***	.297***	.177***
Male × black	−.252*	−.260*	−.131	—	—	—
Education (years)	—	−.035**	−.016	—	−.037**	−.021**
Married	—	.015	.005	—	−.058	.027
Annual earnings	—	−.031	−.001	—	−.025	−.012
Male × annual earnings	—	—	—	—	−.092	−.073*
Private-sector employee	—	.104*	.080*	—	−.011	−.019
Goods-producing industry	—	.035	.010	—	.020	−.008
Occupational standing	—	−.031	−.016	—	−.078***	−.040*
Male × occupational standing	—	—	—	—	.086**	.051*
Baseline self-rated poor health	—	—	.501***	—	—	.094***
Baseline depressive symptoms	—	—	.084***	—	—	.413***
Constant	2.27***	2.93***	1.40***	−.236***	.472	−.042
N (observations)	3,839	3,839	3,839	3,816	3,816	3,816
N (individuals)	1,778	1,778	1,778	1,776	1,776	1,776
R²	.022	.050	.291	.031	.072	.263

$* \, p < .05; \; ** \, p < .01; \; *** \, p < .001$

Notes: ACL = Americans' Changing Lives study. Coefficients obtained from ordinary least squares linear regression models, with correction of standard errors for multiple observations per individual (see text).

TABLE 3. Unstandardized Coefficients from Ordinary Least Squares Regression Models of Self-Rated Poor Health or Depressive Symptoms on Involuntary Job Loss and Selected Independent Variables—WLS Respondents

	Self-Rated Poor Health			Depressive Symptoms		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Involuntary job loss	.170***	.135***	.129***	.183***	.161***	.147***
Male	.039*	.383**	.434**	−.126***	−.742***	−1.23***
Education (years)	—	−.035***	−.031***	—	−.034**	−.010
Male × education (years)	—	—	.028*	—	.046***	.028*
Married	—	−.086**	−.084**	—	−.177***	−.162***
Annual earnings	—	.001	.001	—	−.003	.001
Male × annual earnings	—	−.030*	−.029*	—	—	—
Private-sector employee	—	−.012	.006	—	−.004	.008
Goods-producing industry	—	.047*	.051*	—	.055	.061
Occupational standing	—	−.036***	−.027**	—	−.029*	−.014
Mother's schooling (1957)	—	—	−.010**	—	—	−.019***
Head's occupational status (1957)	—	—	−.001	—	—	.001
Parent's income (1957)	—	—	−.037	—	—	.102
Mental ability (11th grade)	—	—	.000	—	—	−.008***
Male × mental ability	—	—	—	—	—	.007***
Labor force experience (1975)	—	—	.000	—	—	.001*
Employer tenure (1975)	—	—	−.002	—	—	−.006*
Had pension (1975)	—	—	−.009	—	—	−.071*
Male × had pension (1975)	—	—	−.088*	—	—	—
Union member (first job)	—	—	.072**	—	—	.042
Constant	1.78***	2.34***	2.61***	2.48***	3.13***	3.05**
N (individuals)	6,115	6,115	6,115	6,066	6,066	6,066
Adjusted R²	.012	.044	.049	.010	.016	.026

$* \, p < .05; \; ** \, p < .01; \; *** \, p < .001$

Notes: WLS = Wisconsin Longitudinal Study. Coefficients obtained from ordinary least squares linear regression models.

worse for those who experienced an involuntary job loss. In additional analyses using the ACL sample (not shown) we adjusted for other measures of baseline health, estimated the models using only respondents who were healthiest at baseline, and restricted the samples to similar age ranges and historical periods to those represented by the WLS sample. Results were substantively similar.

Model 3 for WLS respondents includes other typically unmeasured and potentially confounding factors: family background, mental ability, and early-career working conditions in 1975. The results show that mother's education is associated with better self-rated health and lower depressive symptoms, while having been a union member in the first job spell is associated with poorer self-rated health. Having had pension coverage early in the career protects WLS respondents against later depressive symptoms, and protects WLS males against poor self-rated health. Nonetheless, model 3 shows that self-rated poor health and depressive symptoms are still significantly worse among ACL and WLS respondents who experienced an involuntary job loss than among those who did not lose a job, though the effect sizes are reduced by between 18 and 30 percent from those obtained with the unadjusted model 1.

Additional Controls for Health Selection and Reemployment

The next stage of the analysis builds further on the unique strengths of our two data sources. These models use alternate methods to identify how health selection may influence the relationship between job loss and subsequent health, and to inform the results obtained in our basic models and in other studies where such extensive controls for health selection are not possible.

Effect of Specific Category of Involuntary Job Loss on Health

Model 4 in Table 4 shows estimates of the impact on WLS respondents' self-rated poor health and depressive symptoms of each of the distinct, self-reported reasons for job loss (with no job loss as the comparison category), controlling for all the covariates included in model 3. We do not display the estimated effects of these predictors because they do not substantively differ between models 3 and 4.

The results for model 4 show that involuntary job losses occurring as a result of displacement are associated with significantly poorer self-rated health, but the estimated effect associated with a job loss for health reasons is, as would be expected, much larger. Those who experienced an involuntary job loss due to displacement, firing/layoff, temporary or seasonal job loss, or for health reasons have statistically significantly greater depressive symptoms, compared with individuals who have not experienced a job loss, with the largest effects observed for job losses due to a temporary or seasonal layoff and for health reasons. In model 5, we collapse job losses that occurred for reasons other than health into a single category and compare their impact with the health effects associated with a job loss for health reasons. Job losses for health reasons are associated with substantially poorer self-rated health ($\beta = 0.50$), while job losses for other reasons have a small but significant negative effect ($\beta = 0.05$). By contrast, the effect of a job loss for health reasons on depressive symptoms is only about twice as large as the effect of a job loss for other reasons ($\beta = 0.29$ vs. $\beta = 0.12$). Both are substantial and statistically significant.

Occurrence and Timing of Health Shocks

As discussed above, two categories of job loss can be distinguished for ACL respondents, using information on the timing of job losses and health shocks: (1) likely cases of health selection and (2) cases not attributable to health selection. There are 48 cases in which an involuntary job loss and a health shock occurred in the same month, or the ordering of events is not clear due to missing information. In model 6 we assign these indeterminate cases to the category of job losses likely due to health selection, while in model 7 we shift them to the category not attributable to health selection. Models 6 and 7 control for all the predictors in model 3; as effects did not substantively change from those shown for model 3, they are not displayed.

The results for model 6 in Table 5 show that both self-rated poor health ($\beta = 0.42$) and depressive symptoms ($\beta = 0.41$) grew significantly worse for those who experienced a job loss that may have been caused or influenced by a prior health shock, relative to respondents who didn't experience job loss. Under this relatively conservative classification in model 6,

TABLE 4. Unstandardized Coefficients from Ordinary Least Squares Regression Models of Self-Rated Poor Health or Depressive Symptoms on Reasons for Involuntary Job Loss and Selected Independent Variables—WLS sample

	Model 4	
Job-loss category (omitted category: no job loss)	Self-Rated Poor Health	Depressive Symptoms
Health reasons (n = 309)	.499***	.288***
Displacement (n = 979)	.056*	.085*
Firing/layoff (n = 263)	−.018	.142*
Temporary/seasonal loss (n = 83)	.139	.402**
Business failure (n = 31)	.111	.119
N (individuals)	6,115	6,066
Adjusted R^2	.064	.027

	Model 5	
Job-loss category (omitted category: no job loss)	Self-Rated Poor Health	Depressive Symptoms
Job loss for health reasons (n = 309)	.498***	.287***
Job loss not for health reasons (n = 1,356)	.047*	.116**
N (individuals)	6,115	6,066
Adjusted R^2	.063	.027

* $p < .05$; ** $p < .01$; *** $p < .001$
Notes: WLS = Wisconsin Longitudinal Study. Coefficients obtained from linear regression models. Models 4 and 5 adjust for all covariates included in Model 3, presented in Table 3.

respondents who lost their job for reasons other than poor health did not show significantly poorer self-rated health over follow-up than those without a job loss ($\beta = 0.05$), while there was only weak evidence that they had increased depressive symptoms ($\beta = 0.11$, $p = 0.07$). However, when indeterminate cases are reassigned to the category of job losses not attributable to health selection, both types of job loss are associated with negative health consequences. The results from model 7 suggest that the impact of losing a job for health reasons is greater for self-rated poor health ($\beta = 0.34$) and depressive symptoms ($\beta = 0.46$) than the im-

TABLE 5. Unstandardized Coefficients from Ordinary Least Squares Regression Models of Self-Rated Poor Health or Depressive Symptoms on Ordering of Involuntary Job Loss and Health Shocks Under Two Coding Scenarios—ACL Sample[a]

	Model 6	
Job-loss category (omitted category: no job loss)	Self-Rated Poor Health	Depressive Symptoms
Health-selective job loss—inclusive coding (n = 89)	.420**	.414**
Job loss not attributable to health selection—conservative coding (n = 278)	.054	.109
N (observations)	3837	3815
N (individuals)	1,778	1,776
R^2	.293	.265

	Model 7	
Job-loss category (omitted category: no job loss)	Self-Rated Poor Health	Depressive Symptoms
Health-selective job loss—conservative coding (n = 41)	.339*	.461**
Job loss not attributable to health selection—inclusive coding (n = 326)	.116*	.147*
N (observations)	3837	3815
N (individuals)	1,778	1,776
R^2	.291	.264

* $p < .05$; ** $p < .01$; *** $p < .001$
Notes: ACL = Americans' Changing Lives study. Coefficients obtained from linear regression models. Models 6 and 7 adjust for all covariates included in Model 3, presented in Table 2.
[a] There are 48 individuals for whom both an involuntary job loss and a health shock occurred in the same month, or for whom the ordering of events is not distinguishable due to missing information. In Model 6 we assign these indeterminate cases to the category of job losses likely due to health selection, while in Model 7 we shift them to the category not attributable to health selection.

pact of losing a job for other reasons ($\beta = 0.12$ and $\beta = 0.15$, respectively), but both have significant negative effects. The true health impacts of these two job-loss scenarios probably lie somewhere between the estimates shown in models 6 and 7.

CONCLUSIONS

In this study we have assessed whether involuntary job loss is associated with subsequent health decline after carefully controlling for health selection and other confounding factors. We have applied adjustments for a richer than usual set of social and family background characteristics, mental ability, early-career working conditions, and baseline health measures—and, more uniquely, for specific reasons for involuntary job loss (in the WLS) or for serious or life-threatening health shocks occurring in the few years prior to the involuntary job losses in question (in the ACL). These distinct measures of health selection are not equivalent and cannot be directly compared within a single sample, but they likely do a better job of capturing health-related job losses than much of the existing research. The findings of this study are also relatively unique in comparing the impact of involuntary job loss on health using data from two different longitudinal studies, one of them nationally representative, and both with a long period of follow-up. Our samples also include men and women across the occupational spectrum, making these findings much more applicable to the general working population than earlier studies that focus on particular geographical areas or single industries.

In models similar to those used in other longitudinal studies (Tables 2 and 3), we find that an involuntary job loss is associated with poorer subsequent self-rated health and increased depressive symptoms, even after adjustment for a wide array of potentially confounding factors, a finding that supports past evidence. However, models that adjust these basic findings in new and unique ways for potential cases of health selection substantially alter conclusions drawn from the basic models. Isolating cases of job loss for health reasons (Table 4) or cases where job loss was preceded by a serious or life-threatening health event (Table 5) shows that job losses precipitated by health problems are associated with large negative effects on both self-rated poor health and depressive symptoms. Job losses for other rea-

sons have a smaller—but still statistically significant and substantively important—effect on depressive symptoms, while effects on self-rated poor health are small.

It is not surprising that people who experience a health-related job loss would have poorer subsequent health trajectories relative to those who lose jobs for other reasons. They have started off with a deficit in health large enough to take them out of work, and this interruption in employment can have additional detrimental effects, whether through economic or social deprivation. Our findings suggest, however, that while involuntary job losses not caused by health problems have a smaller measured impact, they are nonetheless also potentially harmful to overall physical health. The estimated direct effects of involuntary job loss that we present here may also be conservative, due to the influence of moderating factors occurring after a job loss that we do not pursue in the present analysis. Specifically, the category for job losses not attributable to health reasons shown in Table 5 represents a mix of ACL respondents, some of whom experienced a subsequent health shock or remained unemployed, and others of whom did not. In analyses not shown here, we found that respondents who experienced a health shock *after* losing their job showed much more substantial health decline, compared with those who lost a job but never experienced a subsequent health shock. The estimated effect of a job loss not attributable to health reasons thus reflects an effect averaged over a small number of respondents who went on to suffer an acute health problem and a larger number of individuals who did not experience a health shock.

Similarly, we do not adjust for employment status at follow-up in the results presented here because its meaning in the context of such lengthy periods of observation is unclear. In analyses not shown here, however, we explored employment status at follow-up because a return to work could reduce or eliminate the negative health effects of either the involuntary job loss itself or any subsequent unemployment experience. Generally, individuals who lost a job but were reemployed when we observed them at follow-up had better health than their counterparts who remained unemployed. Moreover, respondents who lost a job for health reasons manifested greater health declines regardless of reemployment, though effects were much stronger for those who were not working at fol-

low-up. Those who lost a job for other reasons appeared to suffer health consequences only if they were not employed at follow-up. Future work would benefit from careful consideration of the chain of events occurring *after* the job loss, as well as those leading up to it; the latter have been the focus of our analysis.

A remaining consideration is whether the relatively low levels of variation in health explained by involuntary job loss reduce the importance of the present findings. Values of R^2 are low in models 1 and 2, while there is a notable rise when we add baseline measures of health in model 3 for the ACL respondents. This improvement is not surprising, because earlier health is clearly one of the strongest predictors of later health. Central to the aims of our analysis, we continue to find significant associations between involuntary job loss and subsequent health after controls for baseline health. It is also crucial to note that measures of education, earnings, race, and age, commonly regarded as key predictors of health, are included in all models, even those with the lowest proportion of explained variance. The production of health is clearly very complex, but we argue that involuntary job loss can have a meaningful impact on well-being, along with other factors considered here and a multitude of unmeasured influences.

The present analysis has several important implications for future research on the health effects of acute stressors or life events. Results indicate that controlling for health at some earlier time point (such as the last survey wave) may not be sufficient to adjust for all instances of health selection. We found that it is important to take health shocks into consideration as potential catalysts for other negative life events, like job loss. Future analyses of the consequences of involuntary job loss would be enhanced by data that included more detailed reports about the nature and timing of health shocks between survey waves, as well as respondent self-reports about the reasons for job loss. Our finding also has general applicability to the study of life events, such as marital status change; ignoring the co-occurrence and timing of health shocks may produce inflated estimates of the impact of the focal negative life event on changes in health, even if such studies include measures of "baseline" health. Ignoring unmeasured health shocks could disguise the fact that the estimated health effect associated with any life event may reflect an average of a strong effect among a small set of persons for whom health problems precipitate the event, versus a minor or moderate deleterious effect on the health of a larger set of individuals. The series of events and shocks that follow a focal life event may also be important moderators of the subsequent health trajectory, as discussed above.

This study has focused on identifying the degree to which involuntary job loss could generate health decline, net of the influence of individuals who bring health problems with them to the workforce or those who experience negative health events that cause them to lose jobs. A larger issue is the extent to which individuals in each of these scenarios would benefit from health and labor-market policy changes. Our results suggest that while workers who lose jobs for nonhealth reasons experience greater depressive symptoms than they would have experienced had they not lost a job, workers who lose their jobs for health reasons experience the most precipitous worsening of depressive symptoms and self-rated poor health. This latter group may also suffer the most from the loss of economic and noneconomic benefits of work, and they may face the most difficulty returning to work. Workers who lose their jobs for health reasons merit increased attention in future research and policy aimed at assessing and negotiating adverse consequences of job loss for physical and mental health and well-being.

NOTES

1. A related body of research examines the potential impact of differential vulnerability to the stresses and strains associated with a life event such as job loss (Kessler, House, and Turner 1987; Turner, Wheaton, and Lloyd 1995). For example, there is some evidence that people of lower socioeconomic standing may be more vulnerable to health effects of involuntary job loss because they have fewer financial resources to make up for the earnings loss; however, individuals of higher socioeconomic position may have greater employment commitment, exacerbating the emotional impact of the job loss (Turner 1995). In this analysis, we do not directly engage the issue of differential vulnerability.

2. A limited number of losses to follow-up occurred due to mortality (n = 58), while another group were lost due to survey non-

response (n = 272). Time-varying weights to account for death and survey nonresponse did not change our substantive findings, so we present analyses using the baseline sampling weight. Measures were imputed for annual earnings (6.9% of otherwise eligible observations) and occupational standing (3.0% of observations) using regression-based linear multiple imputation with STATA 8.0SE software. Missing observations for private employer (1.7% of observations) and goods-producing industry (5.1% of observations) were assigned for a given person-spell based on the values for earlier or later spells for that individual; where other information was not available, respondents were assigned to public employer and non-goods-producing industry. Dichotomous control variables indicating missing data on these measures were created and tested in all analytic models; estimated coefficients associated with these indicators are not reported, as they were generally not statistically significant.

3. In the WLS sample, 576 respondents died before follow-up in 1992/1993, and 1,414 failed to respond to the phone and mail surveys in that wave. There are no known biases associated with attrition in the WLS sample, but any bias associated with health-selective mortality or mortality associated with a job loss in the WLS or ACL samples would make our estimates of the impact of involuntary job loss on health more conservative. Among the remaining eligible respondents, information was imputed for measures of parents' income (4.9% of otherwise eligible observations) and household head's occupational status (0.98% of otherwise eligible observations). As for the ACL models, dichotomous control variables indicating missing data on these measures were created and tested in analytic models; estimated coefficients associated with these indicators are not reported, as they were generally not statistically significant.

4. The definition of a "serious" or "life-threatening" health event was left to the respondent, so there may be some variation in the objective severity of the event; however, in analyses not shown here, we found that changes in self-rated poor health over time were strongly related to self-reported incidence of serious chronic conditions among ACL respondents (which are captured in reports of health shocks).

5. Person-spells from the ACL were included in the main analysis only when the respondent was employed in the baseline year for a particular spell (e.g., in 1986, 1989, or 1994). If a respondent was not employed in the baseline year, they were not asked about their working conditions for that period of observation, so key predictors for our multivariate models are missing. To assess the impact of omitting such cases, we estimated a set of models parallel to those used in the main analysis, but omitting job characteristics and including all individuals who reported working in the given person-spell. Results were similar to the main findings, so omitting these cases does not appear to affect our conclusions.

6. For the approximately 10 percent of individuals who had more than one involuntary loss over this period, we considered the reason associated with the first loss. In analyses not shown here, we explored the possibility that our findings are driven by a small group of individuals in the WLS and ACL samples who experienced multiple involuntary job losses. We estimated models that omitted respondents reporting more than one involuntary job loss, and we created separate categories for respondents who lost a job only once versus more than once. Our main findings were not appreciably altered by these adjustments.

7. There are several significant sex differences in the effects of predictors of health outcomes in models 2 and 3, and these are included to achieve the best-fitting models, but we do not discuss them in detail, as they are not directly related to the relationship between involuntary job loss and health.

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Sarah A. Burgard is Assistant Professor of Sociology and Epidemiology at the University of Michigan, and she is assistant research scientist at the Population Studies Center in the university's Institute for Social Research. Her work examines the consequences of social stratification for population health and health disparities. Currently, her focus is on the health of adults over the working career, as changes in the contemporary United States labor market generate rising insecurity for workers. She also studies cross-national variation in the multilevel determinants of the health of children and adolescents.

Jennie E. Brand is Assistant Professor of Sociology at the University of California–Los Angeles. Her research focuses on the effects of and relationships among social background, educational attainment, labor-market processes, and job conditions on socioeconomic attainment and health and well-being over the life course. She also studies the application and innovation of quantitative methods for longitudinal data analysis.

James S. House is the Angus Campbell Collegiate Professor of Sociology and Survey Research and research professor and former director of the Survey Research Center in the Institute for Social Research at the University of Michigan. His current research focuses on the role of psychosocial factors in understanding and explaining social inequalities in health and the way health changes with age.