CAUSATION AND SELECTION IN THE RELATIONSHIP OF JOB LOSS TO HEALTH IN THE UNITED STATES*

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ABSTRACT

Major macroeconomic changes have increased the risk of involuntary job loss for many U.S. workers, and a job loss could have significant negative consequences for subsequent health. However, poor health may also influence the risk of losing a job. To separate the potential reciprocal relationships between job loss and health, it is necessary to assess both the determinants of job loss and the changes in health that may follow. Results obtained from two longitudinal samples suggest that even after adjustment for extensive social background characteristics, mental ability, early career working conditions, and baseline health measures, involuntary job loss is associated with significant declines in overall self-rated health and worsening of depressive symptoms. Furthermore, taking account of specific reasons for job loss, or severe health shocks that occur prior to or following the involuntary job loss event, demonstrates that typical adjustments for baseline health may not be sufficient. These more nuanced controls reveal that workers who lose their jobs for health reasons or who experience a health shock after a job loss have the most precipitous declines in health, though meaningful effects are evident for all workers experiencing involuntary job loss.

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INTRODUCTION

The organization of work has changed in the United States and in many industrialized countries with changes in global economic conditions, major shifts in the occupational structure favoring the service occupations, and the proliferation of nonstandard work arrangements that may benefit employers at the expense of employees (Kalleberg, Reskin and Hudson 2000; Smith 1997). These changes have been accompanied by an increase in perceived job insecurity, and while the fear of job loss continues especially to affect lower-skilled workers, it has begun to spread throughout the workforce (Farber 2003; Handel 2005). Involuntary job losses occur when individuals are forced to leave employment; for example, because of displacement (e.g., due to downsizing) or layoff, the end of a temporary or seasonal position, business failure, being fired, or because they are unable to continue work for health-related reasons. Anxiety about involuntary job loss for any of these reasons is warranted, given the substantial economic consequences that economists, sociologists and others have identified, 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; Hammermesh 1989; Jacobson, LaLonde and Sullivan 1993; Kletzer 1989; Podgursky and Swaim 1987; Ruhm 1991; Seitchik 1991). Furthermore, a job loss represents the loss of a major social role and contact with social networks on the job (Hayes and Nutman 1981). These changes appear to have serious negative health consequences, with a large body of evidence indicating that working-age 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).

However, it is difficult to specify how, why, and the degree to which a job loss harms health because the characteristics and behaviors of people who lose their jobs may differ from

those of people who remain securely employed. In particular, people who are less healthy may face barriers to labor force entry or have a greater likelihood of involuntary job loss (Arrow 1996; McDonough and Amick III 2001; Repetti, Matthews and Waldron 1989). Furthermore, people who begin life with few socioeconomic resources may be at risk of poor health in early life and may be unable to obtain early career jobs that are likely to lead to a stable career path. Thus, people in poor health or those with social disadvantages may be selected into less stable employment arrangements and face both an elevated risk of job loss as well as a greater risk for poor subsequent health that is independent of the job loss experience.

To sort out the potential reciprocal relationships between job loss and health in this study, we follow people who are employed at the outset of observation and focus on the event of involuntary job loss, taking note of the determinants (including health) of the job loss and the changes in health that may follow from it. Some analysts have focused on the predictors of involuntary job loss, while others have analyzed the health consequences of such a loss, but analyses including both the precipitating factors (social selection), as well as the consequences for health (social causation) are rare (but see Korpi 2001). The present study seeks to estimate the impact of job loss in samples representative of the U.S. population that have been studied over periods of 15 to 35 years. This study contributes to the increasing evidence that taking an either/or approach to causation and selection effects when studying social position and health is overly simplistic, as both can be at work in complex feedback relationships that span the life course (Bartley 1994; Bartley, Ferrie and Montgomery 1999; Korpi 2001; Vagero and Illsley 1995; Valkonen and Martikainen 1995).

How and Why Should Job Loss Affect Health?

Several research traditions have contributed to our theoretical understanding of the way a job loss could affect subsequent health. Sociologists of mental health have long recognized the potential importance of social causation and social selection as competing classes of explanations

for the relationship between mental health problems and social class (Dohrenwend and Dohrenwend 1969; Turner and Wagenfeld 1967). Evidence from these sociological studies generally shows that with the exception of schizophrenia, social causation processes appear to be more important than social selection processes in explaining the relationship between social class and mental health (Aneshensel 1992). Until fairly recently, much of the sociological research on mental health focused on the impact of stressful life events; unemployment and job loss were frequently studied within this framework, and along with other stressful events have been repeatedly 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 in some cases the longer-term effects that arise as a consequence of "acute" events.[i] According to this perspective, an event like involuntary job loss is the precipitating factor, but 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 lost (House 1987; Pearlin et al. 1981).

Research in social stratification and economics has also explored 'trigger events,' such as labor market transitions. The social and economic consequences of job displacement, or an involuntary job loss that results from firms downsizing, restructuring, closing plants or relocating, or layoffs from which the worker was not recalled, have received considerable attention from economists. This research shows that a job displacement typically entails a substantial period of non-employment (Farber 2003; Kletzer 1989; Podgursky and Swaim 1987; Ruhm 1991; Seitchik 1991), a major loss of income and increased financial strain (Hammermesh 1989; Jacobson, LaLonde and Sullivan 1993; Podgursky and Swaim 1987; Ruhm 1991; Seitchik 1991), and reduced job quality when reemployed (Brand 2004). These consequences appear to have lasting effects on long-term earning potential (Brand 2004; Jacobson, LaLonde and Sullivan 1993; Podgursky and Swaim 1987; Ruhm 1991; Seitchik 1991), and could reduce an

individual's ability to purchase health-promoting goods. Losing a job may also have consequences for both health-related and non-wage economic benefits derived from employment, such as health insurance coverage, pension and other benefits (Brand 2004; Podgursky and Swaim 1987).

These findings suggest that involuntary job loss represents a dramatic shock to an individual's social position, and such shocks could be hazardous to health. However, human capital theories, developed heavily by economists, typically view health as a determinant of the investments that people make in education and job training, as well as their ability to perform in a job. In this framework, health is an important resource that drives socioeconomic achievement, as healthy people work more and earn more than unhealthy people (Grossman 1972), and this health selection may explain some or all of the relationship between involuntary job loss and health.

Finally, sociologists and epidemiologists have often focused more on non-economic as well as economic mechanisms connecting job loss to health problems. An involuntary job loss could spell 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 somewhat stigmatized, 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 immediate disruption to a major social role and possible long-term economic and non-economic consequences, but failure to account for social and health selection may upwardly bias estimates of the impact of a job loss on health.

Evidence Regarding the Health Consequences of Job Loss

Much of the early support for a relationship between job loss and health emerged from studies of unemployment. A large body of evidence suggests that among people capable of working, the experience of unemployment has substantial negative effects on physical and mental health.

Unemployment has been linked to physical health outcomes ranging from self-reported physical illness (Kessler, House and Turner 1987) to mortality from suicide (Platt 1984), and to mental health consequences including increased depressive symptoms (Dooley, Catalano and Wilson 1994) and reduced self-reported well-being (Laheima 1989). Unemployment has also been shown to increase the use of tobacco and alcohol (Dooley, Catalano and Hough 1992; Lee et al. 1991; Montgomery et al. 1998), which could impact physical health in the long term. Nonetheless, many of the studies proposing that unemployment leads to poorer health outcomes are subject to the critique that some proportion of the unemployed population suffers from health or social deficits that both constrain labor force entry or increase the probability of an involuntary job loss and explain poorer subsequent health outcomes.

Indeed, other studies of unemployment that focus on selection mechanisms have shown that physical and mental health deficits and negative health behaviors predate unemployment (Catalano et al. 1993; Ferrie 1997; Klein-Hesselink and Spruit 1992; Leino-Arjas et al. 1999). Among the limited number of studies focusing specifically on the way that health influences changes in employment status, there is evidence that in the United States, Sweden, and Norway, healthy people are more likely to enter employment, while those in poor health are more likely to leave employment (Korpi 2001; Mastekaasa 1996; Vagero and Lahelma 1996; Waldron 1980). Mastekaasa (1996) showed that Norwegian respondents with psychological health problems were more likely to be laid off and those with psychological or physical health problems were less likely to be reemployed. While these studies suggest that social selection influences the risk of job loss, there are only a limited number of studies on the topic. Among studies that have focused on selection mechanisms, the quality of available measures of health varies, many lack extensive controls for social and family background characteristics, and few consider the health consequences of involuntary job loss.

Stronger evidence that job loss negatively impacts health comes from factory closure studies (e.g., Kasl, Gore and Cobb 1975), because when an entire organization closes it is less likely that specific characteristics of a particular worker are responsible for job loss. Some of the early plant closure studies appear to show that anticipation of closure and adjustment to a new job, once found, are linked to days ill, rather than the experience of the loss itself. Others have found stronger effects on mental health resulting from the layoff experience rather than the anticipation phase (Hamilton et al. 1990). Other plant closure studies found an increased risk of mental distress or increased physician consultations, illness episodes and hospital referrals and attendance (Beal and Nethercott 1987; Keefe et al. 2002). Longitudinal studies that don't focus on factory closure face a more difficult task of eliminating selection bias, as they typically cannot assume that individual's characteristics did not influence the job loss. However, these studies more adequately represent the entire workforce, and the results have greater external validity and wider applicability at the population level. Longitudinal studies have shown that job loss is linked to a greater number of reported medical conditions, higher rates of medical services use, and pension disability use (Ferrie et al. 1998; Westin 1990), as well as physical functioning (Gallo et al. 2000) and 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; Linn, Sandifer and Stein 1985; Turner 1995), and increased alcohol consumption (Catalano et al. 1993; Gallo et al. 2001). However, the relatively limited longitudinal evidence is not always consistent; for example, other studies considering changes in alcohol use suggest that alcohol use may decrease with a job loss (Iversen and Klausen 1986), or that there may be no change in drinking behavior (Broman et al. 1995).

The findings of job loss studies are not as vulnerable to the critiques leveled at studies of unemployment. However, there are several shortcomings in the existing studies of job loss and

health. First, many of the existing analyses have used samples from a single factory, geographical area, or occupational group, such that study populations have not represented the workforce of the United States. As a result, many studies have not been able to examine the health consequences for men and women across the occupational spectrum. Second, even studies using longitudinal data have had limited controls for social selection, both on the basis of initial health status and social and economic background.

Focus of Study

In the present analysis we are interested in exploring the putative causal relationship between an involuntary job loss and subsequent physical and mental health, the selection factors that increase an individual's risk for involuntary job loss, and the way that these forces interact during the adult working life to influence future health. In response to the gaps in the prior research on involuntary job loss and health, we explore several research questions:

1. *What predicts involuntary job loss*? We are able to explore the impact of an extensive set of sociodemographic characteristics, working conditions, health measures, and social and family background characteristics as predictors of involuntary job loss, considerably exceeding the set of characteristics typically available.
2. *Does involuntary job loss predict health net of characteristics that predict job loss*? We will expand on the work done in earlier studies of the consequences of job loss, considering multiple health outcomes among men and women, using two distinct longitudinal population-based surveys, one nationally-representative and the other more localized, both with long periods of follow-up. These models will adjust for the predictors of involuntary job loss identified above.
3. *Does the health impact of an involuntary job loss persist when we apply stronger additional controls for health selection*? In addition to an extensive set of health and social background measures, we also have access to information on the reasons for

involuntary job loss (including an indicator of loss for health reasons), and the timing of job loss events and health shocks. Using this information, we can identify individuals for whom health-based selection seems a likely explanation for the relationship between a job loss and later health. By separating these individuals from those for whom job loss was not likely explained by health problems, we can refine the estimate of the impact of job loss on health.

DATA AND METHODS

We use two complementary data sources to explore our research questions. The American's Changing Lives study (ACL) is a longitudinal cohort comprised of a stratified, multi-stage area probability sample of non-institutionalized adults 25 years 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 the ACL respondents representative of the non-institutionalized population in the contiguous United States in 1986. In the baseline survey in 1986, 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 followed up with subsequent waves of data collection in 1989 (83% of survivors), 1994 (83% of survivors) and 2001/2 (76-80% of survivors). At each wave of data collection, respondents reported on their current health and were also 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 et al. 1990; House, Lantz and Herd forthcoming; House et al. 1994).

We also use data from the Wisconsin Longitudinal Study (WLS). 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 graduates in 1964 and from the

graduates themselves in 1975; tax data were obtained in 1965 from WLS parents and respondents. In 1975 and again 1992/3, telephone and mail surveys were conducted with the original respondents. These data provide a full record of social background, youthful aspirations, schooling, military service, family formation, labor market experiences, and social participation of the original respondents. The WLS has enjoyed relatively high rates of response and sample retention. In 1964 and in 1975, the WLS had response rates of 87% and 89% of survivors, respectively (Sewell et al. 2001). In the 1992/3 round of data collection, the content was extended to obtain detailed occupational histories and extensive information about mental and physical health and well-being. Occurrence and timing of job losses between 1975 and 1992/3 was collected, as well as detailed information about the reason for job loss. Out of 9,741 survivors of the original sample, 87% completed telephone interviews in 1992, 35 years after the initial data collection. Mail survey response, conditional on completed telephone interviews, was about 80%, or about 70% of all survivors.[ii]

By utilizing the unique strengths of each of these datasets, we can obtain a fuller picture of the relationship between involuntary job loss and health. We can also mitigate the possible impact of limitations unique to each data source. For example, the ACL did not collect complete occupational histories from respondents, and does not include family background information that would be useful for exploring the effects of intergenerational transmission of advantage. Furthermore, the ACL was designed to represent the adult population, so includes a relatively small number of individuals at any given age. The WLS is a true cohort of high school graduates, so all respondents are nearly the same age and are followed through the entirety of their early working lives into middle-age. However, everyone in the WLS is a high school graduate and there were only a handful of racial/ethnic minority individuals in the sample, due to the demographic composition of Wisconsin in 1957. Furthermore, information about health was collected only in 1992/3, preventing us from controlling for health status prior to an involuntary

job loss. The ACL is a nationally-representative sample that includes individuals at all levels of completed education and covers the whole United States population, as well as providing the opportunity to explore issues of health-based selection into insecure working conditions. Comparison of results obtained using these two distinct and complementary samples aids greatly in assessing the robustness of our findings.

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 a 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 panel of Table 1, with those specific to each data set below. Significance levels of t-tests for difference in characteristics across categories of job loss history are presented in the second column for each sample. Most of the predictor variables presented for the ACL were collected at baseline in 1986, while health outcome measures presented here were collected in the 2001/2 wave.[iii] Measures for the WLS were collected mainly in 1975, while the health outcome measures refer to health in 1992/93.[iv] All figures for the ACL presented in Table 1 are weighted estimates, while 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, one for physical and one for mental health, to compare the effects of an involuntary job loss on different measures of overall well-being. Self-reports of overall health and depressive symptoms were collected at each wave from ACL respondents and in 1992/3 for WLS respondents. Respondents were asked to rate their overall health at the time of the survey with the typical five category item for self-rated health, with values ranging from excellent (1) to poor (5). In the ACL, average self-rated health scores in 2001/2 range from 2.3

for workers who lost a job to 2.5 for workers who did not lose a job, reflecting a score between "good" and "very good" overall health in 2001/2. WLS respondents have average self-rated health scores of 1.8 for workers who lost a job and 2.0 for workers who did not, falling between "very good" and "excellent," and slightly better that those reported by ACL respondents, partially reflecting their younger average age at the end of observation (about 53 versus 57 years, figures not shown), as well as the higher level of education and largely white race of the WLS sample. Depressive symptoms are measured in both studies using the Center for Epidemiological Studies Depression Scale or 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 and colleagues (1993) demonstrated that this subset had similar reliability when compared to the full scale. In the ACL, responses to each item are scored on a four-item Likert scale, standardized scores of all present items are averaged and the score is then standardized based on the mean and standard deviation of the total 1986 ACL sample, with a final range from -1.2 (least) to 4.7 (most depressed).[v] Surviving ACL respondents interviewed in 2001/2 reported average CES-D scores of -0.37 for workers who did not lose a job to -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 in each of the twenty questions; items are summed for a total range of scores from 0 (least) to 140 (most depressed), and the natural logarithm of this index is used here to reduce skewness (final range 0 to 4.8). WLS respondents reported average CES-D scores of 2.5 for workers who did not lose a job to 2.6 for workers who lost a job.

Involuntary job loss

At each wave of the ACL, all respondents were asked whether they had "an involuntarily job loss for reasons other than retirement" since the last wave of the survey to which they had responded (or in the last three years, in the baseline survey). Using these data, we created up to three person-spell records per respondent; the first possible spell (1986-1989) contains

information about health in 1986 and in 1989, sociodemographic characteristics measured in 1986, and a measure of whether the respondent involuntarily lost a job between 1986 and 1989 as reported in 1989. The second and third spells capture the same information for the 1989-1994 and 1994-2001/2 periods. Using the ACL data it is possible to assess the impact of an 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, prior to the job loss. In the 1992/93 wave of the WLS a detailed employment history was collected from respondents, who were asked about termination of employment spells between 1975 and 1992/3. One person-spell was constructed for each respondent, measuring health in 1992/93, 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.[vi] Involuntary job loss is more explicitly defined in the WLS as the termination of an employment spell due to plant closing, downsizing, relocating; "other involuntary termination" (help no longer needed); temporary or seasonal lay-off; health-related reasons; business failure; or imprisonment.[vii]

Controls

Indicators of the respondent's age and race (Black or non-Black) are included in all models using the ACL sample, to increase comparability with the population sampled for the WLS.[viii] Characteristics correlated with both health and involuntary job loss are also included in the analyses, including sex, educational attainment (years of completed schooling), marital status (currently married or not), respondent's annual earnings (adjusted to 2004 dollars and transformed to the started log), whether the respondent works for a private or public employer, an indicator of whether the respondent worked in a goods-producing industry (manufacturing, mining or construction) or not, and a measure of occupational standing (a started log transformation of the occupational education score for the respondent's three-digit census occupation code) (Hauser and Warren 1997).[ix] Taken together, these sociodemographic and work

characteristics provide a basic outline of the respondent's adult social position.[x] We expect that individuals with higher social position, indicated by greater educational attainment, higher earnings, and higher occupational standing, will be less likely to experience an involuntary job loss and will report better health than their counterparts with less schooling, lower earnings, and lower occupational standing. Married people may be less likely to experience involuntary job loss and more likely to be in better health, compared to unmarried people. The risk of an involuntary job loss is likely to be greater for private employees and in goods-producing industries than for people who work in public employment or self-employment and those who work in other industries (Brand 2004), but expected health differences are less clear.

Further controls for social background utilized in models estimated for WLS respondents include: respondent's mother's schooling (years, measured in 1957), head of parental household's occupational status (coded using Duncan 1970 Socioeconomic Index Score, measured in 1957), parents' income (truncated at $99,800 and transformed with a started log function, measured in 1957), respondent's mental ability (Henmon-Nelson 11th grade IQ score), respondent's labor force experience in 1975 (proportion of time between 1957 and 1975 not known to be out of the civilian labor force), respondent's employer tenure (years with current employer, as of 1975), respondent's pension status (whether in first job spell (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; Ruhm 1991). Brand (2004) also found several family background covariates to be significant predictors of job displacement in the WLS.

Analytic Strategy

We restrict the ACL analytic sample to respondents who were interviewed for the 1989, 1994, and/or 2001/2 surveys (3,118 cases), were working for pay in 1986, 1989, and/or 1994, the

baseline year for a given person-spell (2,108 cases), and were not missing information on involuntary job loss experience, health, or other key covariates (1,778 cases).[xi] For these respondents, there were 141 involuntary job losses in the 1986-1989 period, 134 in the 1989-1994 period, and 133 in the 1994-2001/2 period, for a total of 408 losses.[xii] Using the WLS data, we restrict our analysis to respondents who were interviewed by phone and mail for the 1992/93 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).[xiii] In the analytic sample for the WLS, 1,666 respondents reported an involuntary job loss at some time between 1975 and 1992/3.

There is mixed evidence for sex differences in patterns of selection and causation related to work and health. A common prediction is that women would be more reactive to poor health, i.e. be more likely to leave work in the presence of poor health, because they have greater discretion over their labor supply (Ruhm 1992) and because joblessness is not a stigmatized state for women (Stolzenberg 2001). However, the few studies that examine gender contingencies in health selection produce mixed results (McDonough and Amick III 2001): some find that men are more likely than women to leave the labor force in the presence of poor health or disability (Belgrave, Haug and Gomez-Bellenge 1987; Loprest, Rupp and Sandell 1995), while others find that women are more likely than men to leave work (Chirikos and Nestel 1984; Mullahy and Sindelar 1990), and still others find that effects do not vary much by sex (van de Mheen et al. 1999). Turning to the evidence suggesting sex differences in putative causal effects of job loss, a study using American twin pairs found only very limited evidence that men were more sensitive to the depressive effects of a job loss (Kendler, Thornton and Prescott 2001), and a study of Swedish respondents found that the effects of past unemployment on mortality were, if anything, slightly stronger among women than men (Nylen, Voss and Floderus 2001). In the present

analysis we estimate models using pooled samples that contain men and women, adding appropriate interaction terms between respondent's sex and relevant predictor variables. 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.[xiv] In the present analysis our focus is on the overall impact of involuntary job loss on health; we briefly discuss some relevant sex differences below, but future work should conduct a more focused exploration of sex differences in the context and consequences of the job loss and health relationship.

Throughout the analysis, we estimate models separately for the ACL and WLS samples because each dataset contains unique predictors and some measures are coded differently across the samples. To make the results comparable to those using the nearly all-white and same-age respondents in the WLS, all models using the ACL sample adjust for respondent's age at baseline and race. Using the pooled person-spell ACL sample, we estimate general linear models using generalized estimating equations (GEE), which adjust for the bias introduced by the correlation between repeated measures of observed covariates and outcomes for the same subject over time (Hannan and Young 1977; Zeger and Liang 1986; Zeger and Liang 1992).[xv] GEE models treat this correlation as a nuisance parameter by estimating a within-subject correlation separately from the regression parameters, resulting in consistent estimates of the regression coefficients without the necessity of strong assumptions about the actual structure of the correlation. In analyses with the ACL sample, we model self-rated health and depressive symptoms as continuous outcomes, using the Gaussian distribution and an identity link function, and specify an independent correlation structure. For models of involuntary job loss, a dichotomous outcome, we use a binomial distribution with a logit link, and specify an exchangeable correlation structure. The WLS respondents contribute only one observation to the

analytic sample, so we estimate logistic regression models of involuntary job loss and OLS multiple regression models of self-rated health and depressive symptoms.[xvi]

RESULTS

What predicts involuntary job loss?

We begin with an exploration of the selection processes that determine who loses a job. Table 2 presents coefficient estimates from logistic regression models that represent the estimated difference in the likelihood of job loss associated with a given predictor, and standard errors associated with these coefficients are presented below in parentheses. Model 1 includes common job displacement predictors measured in the same way for the ACL and WLS samples. The results of Model 1 indicate that there are sex differences in the risk of involuntary job loss that appear particularly in differential effects of predictors for men and women.[xvii] Years of education are associated with a significantly decreased risk of job loss among WLS respondents but not ACL respondents, while being married significantly reduces the likelihood of job loss among ACL but not WLS respondents. Annual earnings have no significant effect among ACL or WLS respondents in Model 1. Working in the private sector increases the risk for both ACL and WLS respondents, though the effect is greater among WLS men than WLS women. Among WLS respondents, higher occupational standing is associated with significantly lowered risk of job loss for women, but not for men. In the ACL sample, the risk of involuntary job loss decreases with age and increases with the number of years between waves, increasing more so for women than for men.[xviii]

Next we estimate Model 2, adding ACL respondents' reported self-rated health and depressive symptoms at the baseline of the person-spell, and WLS respondents' family background characteristics, mental ability and early working conditions, to assess whether these factors affect the subsequent risk of an involuntary job loss above and beyond the effects of the

basic sociodemographic predictors. The ACL results for Model 2 suggest that poorer self-rated health is weakly associated with a greater risk of involuntary job loss for women, but lowered risk for men.[xix] The effects of other covariates are not substantially altered by inclusion of baseline health characteristics. Turning to the WLS respondents, we find that the likelihood of experiencing an involuntary job loss is lower for those individuals who had longer tenure with their employer in 1975, had access to a pension, and for men only, among those who were union members in their first jobs. These results suggest that in general, individuals with more favorable working conditions early in their careers are less likely to later experience an involuntary job loss. Interestingly, in Model 2 annual earnings are significantly positively associated with the risk of an involuntary job loss for WLS women but not WLS men. This could result from the correlation between the incomes of respondents and their parents. Finally, with the addition of family background, mental ability and early career conditions, the protective effect of marriage becomes statistically significant and the effect of being in a goods-producing industry becomes significantly positive, and the sex difference in the effect of occupational standing is reduced. The effects of other predictors in the WLS model do not change substantively in Model 2.

There are notable differences in the estimated effects of major sociodemographic characteristics, such as educational attainment, across the ACL and WLS samples. There are many reasons to expect that the processes that put people at risk of involuntary job loss would differ between these two very different samples. The objective of this portion of the analysis is to identify for each sample the characteristics that, if omitted from models predicting health, would likely bias our estimates of the effect of involuntary job loss.

Does involuntary job loss predict health net of characteristics that predict job loss?

We now turn to assessing the impact of an involuntary job loss on subsequent health; results from these linear regression models are presented in Table 3 and 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 across samples in the way this information was collected. First, in Model 3 we obtain upper-bound estimates of the impact of job loss on self-rated overall health and depressive symptoms, adjusting only for the respondent's sex in the WLS model and for sex, age, black race, person-spell under observation (1986-1989, 1989-1994, or 1994-2001), and whether the respondent ever died over follow-up in the ACL model (additional covariates used to make the results comparable across samples). In these baseline models, self-rated health and depressive symptoms are significantly worse for ACL and WLS respondents who report a past involuntary job loss.

Next, in Model 4 we adjust these upper-bound estimates of the causal effect of involuntary job loss on health for the effects of selection on the basis of the basic sociodemographic and work characteristics that predict job loss. With these adjustments, differences in self-rated health and depressive symptoms associated with an involuntary job loss are still statistically significant, though modestly reduced, proportionately more so for psychological distress than for self-rated health in the ACL, but more so for self-rated health than for depressive symptoms in the WLS. Several of the indicators of social position that influence the risk of an involuntary job loss in Models 1 and 2, such as respondent's educational attainment or marital status, also exert independent effects on health outcomes in Model 4. Other factors, such as private sector employment, strongly influence the risk of a job loss but have less of an independent effect on subsequent health. There are several significant sex differences in the effects of predictors: educational attainment is protective against depressive symptoms for WLS women, but not men. Annual earnings are associated with better self-rated overall health among WLS men, but not their female counterparts, while higher annual earnings and occupational standing are protective against depressive symptoms among ACL women but not men. Among

ACL women, black race is associated with significantly poorer overall self-rated health, while the race difference among ACL men is small.

Finally, in Model 5 we estimate self-rated health or depressive symptoms at the end of a person-spell, adjusting for the respondent's report of their health (ACL) or family background, mental ability, and early career working conditions (WLS) at the baseline of that spell.[xx] We find that self-rated overall 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% from those obtained with the unadjusted model.[xxi] For ACL respondents previously measured self-reported health or depressive symptoms were very strong and significant predictors of later health. For WLS respondents, 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 worse health on both measures. Among WLS men but not women, having grown up with a household head with higher occupational status was associated with increased depressive symptoms. Women who had higher measured mental ability in 11th grade currently have lower depressive symptoms, while mental ability is not protective for men. Having had pension coverage early in the career protects WLS respondents against later depressive symptoms, while pension coverage is associated with better self-rated health among men but not women.

Overall, comparison of results obtained from the simpler Models 1 and 4 and the expanded Models 2 and 5 suggests that while baseline measures of health or measures of family background and early career characteristics add to our ability to predict involuntary job loss or health outcomes, they do not dramatically alter conclusions obtained from studies of job loss and health that do not include such measures. Relationships between health, family background, and early career conditions shape the achieved socioeconomic characteristics that are often included as predictors in models of employment status and health. In this way, control for baseline health,

family background and early career characteristics is already partially achieved in the more basic models.

Does the health impact of an involuntary job loss persist when we apply stronger additional controls for health selection?

The next stage of the analysis extends upon previous studies, building on the unique strengths of our two data sources. These models address potential alternate ways that health selection may influence the relationship between job loss and subsequent health, and can be used to assess the robustness of the results obtained in our basic models and in other studies in which extensive controls for health selection are not possible.

Effect on Health of Different Reasons for Involuntary Job Loss

Using WLS data we are able to go beyond previous analyses that have relied on an undifferentiated indicator of any form of involuntary job loss. With the respondent's report of the specific reason for job termination, we are able to examine and compare the impact of different circumstances of involuntary job loss, including displacement (N = 979), fire or lay-off (N = 263), temporary or seasonal lay-off (N = 83), business failure (N = 31), and loss for health-related reasons (N = 309). Presumably, different mechanisms of selection may be operating under each of these scenarios. For example, workers generally are displaced because of macroeconomic factors not under their direct control, while a firing may be on the basis of personal characteristics. Furthermore, experiencing a displacement may have different effects on mental and physical health than being fired. Moreover, current health is likely to be influenced heavily by a past job loss for health-related reasons. In Model 6 we estimate the impact on self-rated health and depressive symptoms of each of these distinct reasons for job loss (with no job loss as the comparison category) and compare their relative impact, controlling for all the covariates included in Model 5. We do not display the estimated effects of these covariates because they did not change between Models 5 and 6.

The results of Model 6, presented in Table 4, show that losses occurring as a result of being displaced are associated with a significant worsening of self-rated health, but the estimate associated with a job loss for health reasons is, as would be expected, much larger. People who have experienced an involuntary job loss due to displacement, firing/layoff, for health reasons or due to a temporary or seasonal job loss have statistically significantly greater depressive symptoms, compared with individuals who have not experienced a job loss, with the greatest effects observed for losses due to a temporary or seasonal lay-off and for health reasons.

Workers who report losing a job for health reasons likely lost the job involuntarily, but when assessing their later health it is not possible, given the absence of baseline health measures in the WLS data, to separate health changes resulting from the involuntary job separation from the effect of health problems that existed prior to the job separation. In Model 7, we reassess the impact of an involuntary job loss on self-rated health or depressive symptoms, separating out respondents who report losing their job for health reasons. By segregating all cases where health problems clearly precipitated a job loss, our estimates of the impact of any other kind of involuntary job loss on subsequent health are less vulnerable to the influence of health selection. The results of Model 7 show that the self-rated overall health of those with an involuntary job loss for non-health reasons still differs significantly from that of respondents without a prior loss, though the magnitude of the difference is reduced by about 72% from the estimated effect in the upper-bound Model 3, and by 64% from the full Model 5. However, even after separating out losses for health reasons, the net effect of other types of loss on depressive symptoms remains statistically significant and is reduced by only about 30% from the estimate in Model 3 and 16% from the Model 5 estimate. The meaning of this, which is complex, is discussed below.

Occurrence and Timing of Health Shocks

Unique measures in the ACL allow us to identify cases where an involuntary job loss was accompanied by an acute health crisis. At each ACL survey wave respondents were asked

whether and when they had experienced a range of life events (in addition to an involuntary job loss), including a serious and/or life-threatening health event.[xxii] Such health shocks, typically not captured in longitudinal survey data because they occur between the measurement of health at baseline and at follow up, 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 events. Because we know the year (and in most cases, the month) of the job loss event and the health event, we are able to create a typology of the ordering of events within person-spells: no involuntary job loss and no health shock (N=2,669); a health shock but no job loss (N=809); a health shock clearly preceding a job loss, a health shock and job loss occurring in the same month, or cases where both involuntary job loss and a health shock occurred, but the ordering of events is not distinguishable due to missing information (total N=89); a job loss clearly preceding a health shock (N=41); and a job loss unaccompanied by a health shock (N=237). In Model 8, we estimate the effect of each of these scenarios on self-rated health and depressive symptoms, compared with the outcomes for respondents with no involuntary job loss and no health shock, and controlling for all the predictors in Model 5. Again, the effects of these covariates did not substantively change between Models 5 and 8, so they are not shown. The results for Model 8 in Table 5 show that compared with those who did not lose a job or experience a health shock, respondents with a health shock preceding or occurring around the same time as a job loss had significantly worse self-rated health and depressive symptoms at follow-up.[xxiii] Those who experienced a job loss followed by a health shock had poorer subsequent self-rated health but did not show significantly increased depressive symptoms, while among those with a job loss and no health shock in the interval, only depressive symptoms were significantly increased at follow-up. Health shocks not accompanied by a job loss were associated with significantly poorer health on both measures.

In Model 9, we merge respondents who lost a job prior to a health shock with those who had a job loss but no health shock in the person-spell to create a broader category of involuntary job loss not for health reasons. Compared with respondents who did not have a health shock or a job loss, those with a job loss not attributable to health reasons had significantly poorer self-rated health and significantly greater depressive symptoms. The most conservative estimate of the effect of involuntary job loss on subsequent health comes from the individuals with a job loss but no health shock of any kind, in Model 8; compared with the upper-bound estimate in Model 3, the estimated impact is reduced by about 52% for self-rated health and 38% for depressive symptoms. When we include individuals for whom a health shock followed the job loss in the category of 'job losses not for health reasons,' our upper-bound estimate of the effect is reduced by only about 13% for self-rated health and 37% for depressive symptoms. Clearly, health shocks have a strong impact on changes in self-rated overall health, whether they precipitate a job loss or follow it. By contrast, capturing the occurrence and ordering of health shocks has little impact on our estimates of the way involuntary job loss influences depressive symptoms, although as discussed below the health shocks considered here are likely to be mainly physical rather than psychological in nature.

DISCUSSION OF RESULTS

Our findings generally coincide with those from prior studies that have focused on either involuntary job loss as a predictor of health, or health as a predictor of job loss. In our basic models, we find that an involuntary job loss is associated with poorer subsequent self-rated overall health and increased depressive symptoms. In addition, people who report poorer health and those in less desirable jobs may be more likely to experience a future involuntary job loss, though controlling for baseline socioeconomic position obscures some of these effects. This analysis makes its contribution with a series of models that adjust these basic findings in various

ways for the effects of social and health selection. Our results in Table 3 indicate that deficits in the health of people who have experienced involuntary job loss are robust to a broad range of controls for potential predictors of job loss as well as health (From Table 2), though these adjustments reduce the zero-order estimated effects of job loss on self-rated health and depressive symptoms by 18-30% in both the ACL and WLS data. The robustness of these results is supported by the similarity in findings despite differences in the two samples, and substantive variation in the baseline controls we included to adjust for selection into insecure work. A series of additional tests discussed in Appendix B below show that these findings are resilient to several alternative specifications of the models and analytic samples.

However, more explicit attempts to adjust for the degree to which job loss may be preceded or due to a health event/problem occurring subsequent to all of these baseline controls but prior to the job loss suggests a more nuanced understanding of these estimated causal effects of job loss on physical health and depressive symptoms. In the WLS, isolating the minority of cases in which respondents report that they lost their job for health reasons (Table 4) shows that this experience is associated with quite large effects on both self-rated health and depressive symptoms. Thus, the estimates in Table 4 of the effects of job losses not attributed by respondents to health problems are smaller than those observed in Table 3, especially in the case of self-rated health, though they are still statistically significant. The estimate in Table 4 for the impact of job loss not "for health reasons" on self-rated health is probably a lower bound, as respondents' recollections over up to twenty years may for social desirability or other reasons incorrectly attribute the cause of their job loss to health, especially as we know that job insecurity and anticipation of job loss can produce health problems prior to the actual experience of job loss. The estimated effects on depressive symptoms, however, are probably an upper bound as all available evidence (discussed below) suggests that when respondents think of

"health" reasons, they are thinking primarily of physical health and hence not capturing potential psychological/psychiatric health reasons for job loss.

In the ACL, we also see (Table 5 & Appendix A) that job losses preceded by a major health event are also quite predictive of subsequent health. Where job loss is not preceded by a health event, there remains an estimated effect of job loss on subsequent self-rated health (Model 9 of Table 5) status that rivals or exceeds the estimates in Table 4, though most of this average effect is attributable to the relatively small group of individuals (N=41 in Table 4 and 89 in Appendix A) for whom job loss is followed by a major health event, with the estimated effect of job loss on self-rated health in the absence of such an event no longer significant. In the ACL data estimated effects of job loss on depressive symptoms are largely unaffected by adjustments for health problems/events occurring between the baseline measurements and the job loss. Our results build on a recent analysis using nationally-representative data from the Health and Retirement Study which found that adjusting for baseline health reduced the estimated impact of job loss on a measure of physical disability more than on an indicator of psychological distress (Gallo et al. 2000).

We may observe a more persistent effect of involuntary job loss on depressive symptoms than on self-rated overall health for several reasons. First, the stressors associated with the job loss event may more immediately manifest into measurable depressive symptoms. We may need to wait longer to see the impact of a job loss on physical health, as increases in physical morbidity are driven over the longer term by accumulated exposure to low income, income insecurity, or a lack of health insurance coverage, or as negative health behaviors such as increased alcohol use exert their effects on health. Using the dates of job loss events we created a categorical indicator distinguishing individuals who lost a job up to three years ago, those who lost a job more than three years ago, and those not reporting a job loss.[xxiv] In exploratory models not presented here, we found that among both ACL and WLS respondents the effect of an

involuntary job loss that occurred more than three years prior to interview had a slightly stronger negative effect on self-rated health than a job loss occurring in the past three years, with the effects of a more distant job loss having equal or slightly stronger effects on depressive symptoms than a more recent loss. These results are only exploratory, and are based on small numbers of cases in the ACL sample, but suggest that longer follow-up times may be needed to observe the full effects of job loss on self-rated overall health.

Second, problems of measurement may be preventing us from adequately adjusting for shocks to mental health that could explain some of the stronger persisting association between involuntary job loss and depressive symptoms observed in this study. Clearly, severe or life-threatening physical health events are major predictors of changes in self-rated overall physical health, independent of other life events, including involuntary job loss. They may also be more likely to lead to an involuntary job separation than are mental health events. However, it is difficult to resolve this issue because questions asked about health shocks or health reasons for job loss may have more successfully elicited information about physical health problems. In the WLS, information was collected about the specific health reason for a job termination in 41% of the cases; of these, only a maximum of 16% attributed their loss to a mental health problem or event. These data, while only suggestive, could mean that incident physical health problems are more salient for many job losses, but could also indicate that we have failed to elicit information about relevant serious mental health events. In exploratory models using the ACL sample, we tested whether self-reports of any “other life events” (including physical attack, being robbed, the death of a child, spouse, parent, or other relative, divorce, a major financial problem, or other major life event) explained the persistent association between involuntary job loss and subsequent depressive symptoms (results not shown here). We find that many of these other life events are significantly positively associated with depressive symptoms, even in models that control for involuntary job loss experience. However, considering both the occurrence and

timing of these other life events (in combination with health shocks), we found that the results of our main analysis were not substantively changed. When we restricted our exposure of interest to an involuntary job loss not preceded by a health shock or any other measured life event, we still found a significant association between involuntary job loss and subsequent depressive symptoms. These results suggest that these other life events more influential for depressive symptoms do not account for the relationship with job loss, but further work should be done to better address potential relevant shocks to psychological well-being.

This study is limited by several other measurement issues: reliance on self-reports of general physical and mental health status, and the difficulty of identifying "true" involuntary job losses in survey data. Self-rated health is a commonly-used measure of overall well-being, but is criticized by some as being an insufficiently objective or specific measure of physical health because it is correlated with measures of physical, cognitive, and mental health (Bailis, Segall and Chipperfield 2003). Furthermore, a respondent's reports of self-rated health may change over time not because their health has by some objective measure changed, but because individuals appear to make relative assessments with respect to their age and other factors when they rate their overall health. Nonetheless, due to the ease of collection, self-rated overall health is commonly included in population-based surveys, and is thus one of the measures most often used in studies of social position and health. To compare our results with the existing literature, we utilized self-rated overall health as a global measure of physical health. Moreover, self-rated health has been shown to be related to subsequent mortality (Idler and Benyamini 1997), and there is evidence that self-reports of specific medical conditions also appear to be measured with some error (Baker, Stabile and Deri 2004).

The second potential measurement issue is the difficulty inherent in distinguishing a job loss as "involuntary" and unrelated to health, or as a likely case of health selection. Due to differences in data collection across the data sources used in this study, we employ different

ways to distinguish job losses as involuntary and unrelated to health, or as being health-related. In the ACL, respondents made the distinction themselves, as they were asked to report "involuntary job loss for reasons other than retirement," but we also used information on the timing of health shocks to label some of these involuntary losses as likely cases of job loss for health reasons. In the WLS, respondents were asked an open-ended question about the reasons for terminations of job spells, and we classified the responses as involuntary losses or as voluntary separations. We used WLS respondents' reports of reasons for job loss to divide health related losses from other involuntary losses. Clearly, the potential for different kinds of misclassification error is present across these methods. Respondent attribution of job loss specifically to health reasons in the WLS study appears to be a fairly sensitive indicator of health selection, though it is possible that losses actually caused by poor health may be attributed to other reasons by respondents, or they may not recognize health as central to their job loss. However, it is also possible that respondents may over-report job loss as occurring for health reasons because it may be a more socially acceptable reason for leaving work than other reasons, such as being fired. As analysts, we may have misclassified some job losses as involuntary when they were in fact voluntary in the WLS; likewise, respondents themselves may misclassify job losses as involuntary when they are in fact voluntary in the ACL. Given the reliance on respondent reports in some cases and our own decisions about classification in others, the similarity of the findings across these data sources speaks to the robustness of the relationship between involuntary job loss and health.

CONCLUSIONS

The findings of this study are relatively unique in comparing the impact of involuntary job loss on health using data from two different longitudinal studies, one 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 concentrated geographical areas or single industries. 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 (in the ACL) severe and life-threatening health shocks occurring closely in time to the involuntary job losses in question. Our findings lend support to the emerging view that either/or approaches to causation and selection effects in the relationship between social position and health are insufficient to capture the complexities of working lives. Nonetheless, we find strong evidence that involuntary job loss may be hazardous to health; physical health decline appears to be most evident when a job loss is followed by a negative health event, while depressive symptoms increase regardless of physical health decline that follows the involuntary loss (with better adjustment for psychological/psychiatric events/problems leading to job loss needed in future studies).

The present analysis has some important implications for future research on not only the relationship between social position and health but also the health effects of acute stresses or life events. We found 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, and not enough for a complete understanding of how putative psychosocial stressors may affect health. There is a tremendous amount of life experience that occurs between waves of survey data collection, but it is not typically captured in a longitudinal study that takes periodic “snapshots” of respondents’ characteristics. In the case of the present analysis, we found that acute negative health events may occur between baseline and follow-up measures of health, and it is important to take these kinds of physical health shocks into consideration as potential catalysts for other negative life events, like job loss, or as an alternate explanation for health decline. This finding has general

applicability to the study of life events, such as marital status change or the death of a loved one; ignoring the co-occurrence and timing of severe health events may produce inflated estimates of the impact of the focal negative life event on changes in physical health, even if such studies include measures of "baseline" health. Ignoring these health shocks will also disguise the fact that the estimated average effect of any life event is likely to reflect a strong effect among a small set of persons who experience significant health problems after the event (and who may have special vulnerabilities or lack key adoptive resources), versus a minor or moderate deleterious effect on the health of a larger set of individuals.

In the present analysis, we have focused on obtaining accurate estimates of the reciprocal relationship between involuntary job loss and health, but future work should further explore the mechanisms that explain how job loss can lead to increased depressive symptoms and poorer overall self-rated health. Prior research (Kessler, House and Turner 1987; Kessler, Turner and House 1989) suggests that financial strain may be especially important, and this can be explored more fully in terms of both significant financial problems/events and more gradual erosion of financial well-being and security. Other potential non-financial mediators of the impact of job loss on physical and psychological health and well-being can also be investigated. In addition, we have not directly engaged the issues of differential exposure or differential vulnerability that could elucidate the consequences of job insecurity for population health and health disparities. Our analysis suggests that the risk of involuntary job loss is not distributed equally across population groups, falling more heavily on people employed in the private sector, for example. In preliminary analyses not shown here, we explored potential differences in the effect of an involuntary job loss by education and annual earnings and did not find evidence of significant differences in effects. However, careful analyses of the differential exposure and differential vulnerability hypotheses continue to be important in research on social position and health (Turner, Wheaton and Lloyd 1995), especially in light of the evidence that the overall or average

effects of job loss on health heavily reflects the large effects on health in a smaller group of persons who experience serious health problems/events relatively soon after the job loss. Either inequality of exposure to job insecurity or differences in the way population groups are able to cope with the experience could contribute to the maintenance or exacerbation of population health disparities as the occupational opportunity structure and the distribution of job insecurity continue to evolve.

Finally, the results of this study suggest that experiencing an involuntary job loss may have measurable and meaningful health consequences for many Americans. A focus of the analysis has been to demonstrate the degree to which the relationship between job loss and health is driven by individuals who bring health problems with them to the workforce, and the degree to which job loss itself could generate health decline. A larger issue is the extent to which individuals in each of these scenarios would benefit from health and labor market policy; our results suggest that workers who lose their jobs for health reasons or who experience a health shock after a job loss have the most precipitous declines in health, and this group who may also suffer the most from the loss of economic and non-economic benefits of work, and face the most difficulty returning to work. They merit increasing attention in future research and policy aimed at assessing and negotiating adverse consequences of job loss for physical and mental health and well-being.

Appendix A. Unstandardized Coefficients from GEE Linear Regression (ACL) Models of Self-Rated Health or Depressive Symptoms on Alternate Ordering of Involuntary Job Loss and Health Shocks and Selected Independent Variables.

	Self-rated Health		Depressive Symptoms	
	Model 10	Model 11	Model 10	Model 11
Job Loss Category				
[Omitted] No Job Loss, No Health Shock (N = 2669)	--		--	--
Health Shock Only (N = 806)	0.404***	0.402***	0.205***	0.205***
	(0.042)	(0.041)	(0.038)	(0.038)
Health Shock, Then Job Loss (N= 41)	0.450**	0.448**	0.516**	0.516**
	(0.171)	-0.171	(0.149)	(0.149)
Job Loss, Then Health Shock or Indeterminate Timing (N=89)	0.573***	--	0.307*	--
	(0.119)		(0.122)	
Job Loss Only (N=237)	0.086	--	0.156*	--
	(0.063)		(0.067)	
Involuntary Job Loss, not for Health Reasons (N=278)	--	0.216***	--	0.197**
		(0.059)		(0.060)
N (Observations)	3842	3842	3816	3816
N (Individuals)	1778	1778	1776	1776
Wald Chi^2	1162.7***	1154.8***	766.8***	765.1***

Notes: Coefficients obtained from GEE linear regression models, with standard errors of estimates in parentheses, and significance levels denoted by * $p < .05$, ** $p < .01$, *** $p < .001$. Models 10 and 11 adjust for all covariates included in Model 5, presented in Table 3.

APPENDIX B: Additional Tests

We performed a series of additional tests to assess the robustness of our results and comparability of our findings across the two data sources (models not shown here). One possible alternative explanation for a persisting effect of involuntary job loss on subsequent health is that we do not control adequately for health at the baseline of each person-spell, so that unmeasured forces of health selection are still driving the relationship. Using data from the ACL, we added a set of additional baseline health characteristics to models predicting self-rated overall health and depressive symptoms, so that all models include measures of baseline self-rated health, depressive symptoms, smoking status (current smoker or not), alcohol use (drinks per month), body mass index, and frequency of exercise. These additional adjustments reduce the magnitude of the coefficient for involuntary job loss in the model of overall self-rated health, but it remains a statistically significant predictor, and the effect of job loss on depressive symptoms is unchanged.[xxv] In addition, we reestimated models of self-rated for the ACL sample, retaining only respondents who were in excellent or very good self-rated health at the baseline of the person spell, and find no substantive differences in these results and those obtained with the full analytic sample. In the same way, we reestimated models of depressive symptoms, retaining only individuals who reported depressive symptoms scores below the median at baseline, and find no differences in the results from those obtained with the entire sample.

We also performed a number of tests to assess whether the differences in the characteristics of our two samples may be influencing our results. First, we reestimated the ACL models, restricting the analytic sample to an age range more closely resembling the WLS sample, and find no substantive differences in our results. Another difference that could influence the comparability of our results is historical period. These samples were collected across overlapping, but not identical, calendar years spanning 1975 to 2001. To assess whether macroeconomic or other differences in non-overlapping years have unduly influenced our

results, we reestimate our main set of models restricting the analytic samples to data from 1987 to 1992/3 for WLS respondents and from 1986 to 1994 for ACL respondents, more closely matching the analytic samples in calendar time. Our results are substantively the same using these restricted samples, though the effect of an involuntary job loss is somewhat weaker for the model of self-rated health among ACL respondents than in the main models.[xxvi]

TABLES

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

	ACL		WLS	
Dependent Variables	No Job Loss	Had Job Loss	No Job Loss	Had Job Loss
Self-rated Health[a]	2.31	2.50	1.80	1.97***
	(0.940)	(1.05)	(0.631)	(0.760)
Depressive Symptoms[a,b]	-0.367	-0.181***	2.45	2.64***
	(0.819)	(0.992)	(0.915)	(0.944)
Independent Variables				
% Male	50.4	54.7	49.5	46.9
Education (years)	13.2	13.2	13.6	13.0***
	(2.62)	(2.48)	(2.28)	(1.82)
% Married	74.7	67.0**	89.0	87.9
Annual Earnings	38,694	40,255	37,297	32,219***
	(33,197)	(35,200)	(41,142)	(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	-0.754	-0.956	0.660	0.314***
	(1.58)	(1.38)	(1.36)	(1.20)
Age at Baseline	41.9	37.0***	--	--
	(12.2)	(8.79)		
% Black	9.46	11.7	--	--
Baseline Self-rated Health	2.00	2.06	--	--
	(0.874)	(0.913)		
Baseline Depressive Symptoms	-0.146	0.159***	--	--
	(0.936)	(1.06)		
Mother's Schooling	--	--	10.5	10.3*
			(2.84)	(2.78)
Head's Occupational Status	--	--	33.0	32.5
			(21.6)	(20.6)
Parent's Income	--	--	6.33	6.33
			(0.082)	(0.087)
Mental Ability	--	--	101.9	100.4***
			(14.7)	(14.7)
Labor Force Experience	--	--	64.4	64.4
			(28.3)	(28.9)

(Table continued below).

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

	ACL		WLS	
	No Job Loss	Had Job Loss	No Job Loss	Had Job Loss
Employer Tenure	--	--	5.90	4.72***
			(5.78)	(5.30)
% With Pension	--	--	60.5	47.1***
% Union Member	--	--	23.0	19.4**
N	1447	331	5664	1666

Notes: Standard errors associated with variable means presented in parentheses. Figures based on weighted data, except for column totals. T-tests (two-tailed) for difference between those with no job loss and those who had a job loss were conducted separately for each sample, with significance levels indicated in the column for respondents who had an involuntary job loss at the * $p < .05$, ** $p < .01$, *** $p < .001$ levels.

a. Health outcome dependent variables were measured in 2001 for ACL respondents and in 1992/3 for WLS respondents.

b. Measures of depressive symptoms are not directly comparable across the ACL and WLS samples because of differences in the way this information was collected.

Table 2. Unstandardized Coefficients from GEE Logistic Regression (ACL) or Logistic Regression (WLS) Models of Involuntary Job Loss on Selected Independent Variables.

	ACL		WLS	
	Model 1	Model 2	Model 1	Model 2
Male	0.878**	1.57***	0.285	1.06*
	(0.274)	(0.446)	(0.419)	(0.446)
Education (years)	-0.026	-0.029	-0.062**	-0.087***
	(0.036)	(0.035)	(0.018)	(0.021)
Married	-0.482**	-0.453**	-0.175	-0.184*
	(0.148)	(0.151)	(0.091)	(0.093)
Annual Earnings	-0.106	-0.104	-0.005	0.077**
	(0.081)	(0.082)	(0.023)	(0.026)
Male * Annual Earnings	--	--	-0.066	-0.121**
			(0.041)	(0.043)
Private Sector Employee	0.756***	0.767***	0.450***	0.422***
	(0.185)	(0.185)	(0.092)	(0.093)
Male * Private Sector Employee	--	--	0.410**	0.487**
			(0.140)	(0.142)
Goods-producing Industry	0.077	0.067	0.053	0.205**
	(0.187)	(0.186)	(0.070)	(0.071)
Occupational Standing	0.037	0.049	-0.171***	-0.135***
	(0.052)	(0.053)	(0.037)	(0.038)
Male * Occupational Standing	--	--	0.122*	0.072
			(0.047)	(0.050)
Age at Baseline	-0.031***	-0.030***	--	--
	(0.008)	(0.008)		
Years Between Waves	0.095***	0.095***	--	--
	(0.018)	(0.018)		
Male * Years Between Waves	-0.065**	-0.059*	--	--
	(0.024)	(0.025)		
Ever Died Over Follow-up	0.139	0.179	--	--
	(0.331)	(0.328)		
Black	0.180	0.135	--	--
	(0.159)	(0.161)		

(Table continued below.)

Table 2, continued. Unstandardized Coefficients from GEE Logistic Regression (ACL) or Logistic Regression (WLS) Models of Involuntary Job Loss on Selected Independent Variables.

	ACL		WLS	
	Basic	Full	Basic	Full
Baseline Self-rated Health	--	0.168	--	--
		(0.110)		
Male * Baseline Self-rated Health	--	-0.335*	--	--
		(0.163)		
Baseline Depressive Symptoms	--	0.093	--	--
		(0.081)		
Mother's Schooling (1957)	--	--	--	-0.007
				(0.011)
Head's Occupational Status (1957)	--	--	--	0.001
				(0.002)
Parent's Income (1957)	--	--	--	0.718
				(0.390)
Mental Ability (11th grade)	--	--	--	0.000
				(0.002)
Labor Force Experience (1975)	--	--	--	0.001
				(0.001)
Employer Tenure (1975)	--	--	--	-0.049***
				(0.006)
Had Pension (1975)	--	--	--	-0.550***
				(0.067)
Union Member (First Job)	--	--	--	0.244
				(0.127)
Male * Union Member (First Job)	--	--	--	-0.506**
				(0.160)
Constant	-2.13*	-2.50**	-0.440	-5.07*
	(0.889)	(0.959)	(0.337)	(2.45)
N (Observations)	3843	3839	na	na
N (Individuals)	1778	1778	7330	7330
Wald Chi2/LR Chi2	81.6***	83.9***	226.5***	406.4***

Notes: Coefficients obtained from logistic regression models, with standard errors of estimates in parentheses, and significance levels denoted by * $p < .05$, ** $p < .01$, *** $p < .001$. Wald Chi2 statistics are presented for ACL models and Likelihood Ratio Chi2 statistics are presented for WLS models.

Table 3. Unstandardized Coefficients from GEE Linear Regression (ACL) or OLS Regression (WLS) Models of Self-Rated Health or Depressive Symptoms on Involuntary Job Loss and Selected Independent Variables.

	Self-rated health						Depressive Symptoms[a]					
	ACL			WLS			ACL			WLS		
	Model 3	Model 4	Model 5	Model 3	Model 4	Model 5	Model 3	Model 4	Model 5	Model 3	Model 4	Model 5
Involuntary job loss	0.181*	0.148*	0.145*	0.170***	0.135***	0.129***	0.253***	0.219**	0.178**	0.186***	0.162***	0.152***
	(0.070)	(0.069)	(0.057)	(0.020)	(0.020)	(0.020)	(0.066)	(0.064)	(0.057)	(0.029)	(0.029)	(0.030)
Male	-0.021	-0.014	-0.013	0.039*	0.383**	0.434**	-0.110*	0.943	0.723	-0.104***	-0.602***	-0.874***
	(0.049)	(0.052)	(0.034)	(0.017)	(0.127)	(0.134)	(0.043)	(0.486)	(0.383)	(0.024)	(0.160)	(0.206)
Education (years)	--	-0.035**	-0.018*	--	-0.035***	-0.031***	--	-0.037**	-0.024**	--	-0.034**	-0.010
		(0.013)	(0.009)		(0.005)	(0.005)		(0.011)	(0.008)		(0.010)	(0.011)
Male * Education (years)	--	--	--	--	--	--	--	--	--	--	0.039**	0.019
											(0.012)	(0.013)
Married	--	0.023	-0.010	--	-0.086**	-0.084**	--	-0.054	0.041	--	-0.171***	-0.163***
		(0.045)	(0.032)		(0.027)	(0.028)		(0.042)	(0.031)		(0.040)	(0.040)
Annual Earnings	--	-0.024	0.000	--	0.001	0.001	--	-0.023	-0.015	--	-0.007	-0.004
		(0.024)	(0.018)		(0.007)	(0.008)		(0.028)	(0.024)		(0.008)	(0.009)
Male * Annual Earnings	--	--	--	--	-0.030*	-0.029*	--	-0.091*	-0.068	--	--	--
					(0.013)	(0.013)		(0.046)	(0.036)			
Private Sector Employee	--	0.105*	0.081*	--	-0.012	0.006	--	-0.010	-0.015	--	-0.003	0.016
		(0.047)	(0.032)		(0.019)	(0.020)		(0.043)	(0.031)		(0.028)	(0.029)
Goods-producing Industry	--	0.036	0.014	--	0.047*	0.051*	--	0.020	-0.004	--	0.044	0.047
		(0.058)	(0.039)		(0.021)	(0.022)		(0.054)	(0.038)		(0.031)	(0.031)
Occupational Standing	--	-0.031	-0.019	--	-0.036***	-0.027**	--	-0.078***	-0.042*	--	-0.027*	-0.007
		(0.018)	(0.012)		(0.008)	(0.008)		(0.021)	(0.016)		(0.012)	(0.012)

(Table continued below.)

Table 3, continued. Unstandardized Coefficients from GEE Linear Regression (ACL) or OLS Regression (WLS) Models of Self-Rated Health or Depressive Symptoms on Involuntary Job Loss and Selected Independent Variables.

	Self-rated health						Depressive Symptoms					
	ACL			WLS			ACL			WLS		
	Model 3	Model 4	Model 5	Model 3	Model 4	Model 5	Model 3	Model 4	Model 5	Model 3	Model 4	Model 5
Male * Occup. Standing	--	--	--	--	--	--	--	0.086**	0.052**	--	--	--
								(0.028)	(0.020)			
Age at Baseline	0.006**	0.005*	0.003*	--	--	--	-0.005*	-0.008***	-0.004**	--	--	--
	(0.002)	(0.002)	(0.001)				(0.002)	(0.002)	(0.001)			
Years Between Waves	0.003	0.004	-0.005	--	--	--	-0.007*	-0.005	0.002	--	--	--
	(0.003)	(0.003)	(0.003)				(0.003)	(0.003)	(0.003)			
Ever Died Over Follow-up	0.459***	0.447***	0.263**	--	--	--	0.253***	0.217*	0.221**	--	--	--
	(0.111)	(0.113)	(0.085)				(0.095)	(0.093)	(0.075)			
Black	0.379***	0.335***	0.180***	--	--	--	0.364***	0.292***	0.185***	--	--	--
	(0.078)	(0.078)	(0.048)				(0.058)	(0.055)	(0.037)			
Male * Black	-0.245*	-0.257*	-0.132	--	--	--	--	--	--	--	--	--
	(0.112)	(0.110)	(0.071)									
Baseline Self-rated Health	--	--	0.517***	--	--	--	--	--	--	--	--	--
			(0.020)									
Baseline Depressive Symptoms	--	--	--	--	--	--	--	--	0.436***	--	--	--
									(0.024)			
Mother's Schooling (1957)	--	--	--	--	--	-0.010**	--	--	--	--	--	-0.018***
						(0.003)						(0.005)
Head's Occ. Status (1957)	--	--	--	--	--	-0.001	--	--	--	--	--	-0.001
						(0.000)						(0.001)

(Table continued below.)

Table 3, continued. Unstandardized Coefficients from GEE Linear Regression (ACL) or OLS Regression (WLS) Models of Self-Rated Health or Depressive Symptoms on Involuntary Job Loss and Selected Independent Variables.

	Self-rated health						Depressive Symptoms					
	ACL			WLS			ACL			WLS		
	Model 3	Model 4	Model 5	Model 3	Model 4	Model 5	Model 3	Model 4	Model 5	Model 3	Model 4	Model 5
Male * Head's Occ. Status (1957)	--	--	--	--	--	--	--	--	--	--	--	0.003* (0.001)
Parent's Income (1957)	--	--	--	--	--	-0.037 (0.112)	--	--	--	--	--	0.029 (0.164)
Mental Ability (11th grade)	--	--	--	--	--	0.000 (0.001)	--	--	--	--	--	-0.007*** (0.001)
Male * Mental Ability	--	--	--	--	--	--	--	--	--	--	--	0.004* (0.002)
Labor Force Experience (1975)	--	--	--	--	--	0.000 (0.000)	--	--	--	--	--	0.000 (0.001)
Employer Tenure (1975)	--	--	--	--	--	-0.002 (0.002)	--	--	--	--	--	-0.003 (0.003)
Had Pension (1975)	--	--	--	--	--	-0.009 (0.026)	--	--	--	--	--	-0.062* (0.029)
Male * Had Pension (1975)	--	--	--	--	--	-0.088* (0.038)	--	--	--	--	--	--
Union Member (First Job)	--	--	--	--	--	0.072** (0.022)	--	--	--	--	--	0.090** (0.033)
Constant	2.22*** (0.041)	2.80*** (0.302)	1.36*** (0.217)	1.78*** (0.013)	2.34*** (0.095)	2.61*** (0.701)	-0.265*** (0.040)	0.426 (0.313)	0.170 (0.259)	2.50*** (0.018)	3.18*** (0.161)	3.56** (1.03)
N (Observations)	3853	3843	3843	na	na	na	3827	3818	3816	na	na	na
N (Individuals)	1778	1778	1778	6115	6115	6115	1776	1776	1776	5723	5723	5723
Wald Chi2/Adj. R2	79.4***	124.8***	966.8***	0.012	0.044	0.049	92.1***	172.6***	718.0***	0.010	0.017	0.028

Notes: Coefficients obtained from linear regression models, with standard errors of estimates in parentheses, and significance levels denoted by * p < .05, ** p < .01, *** p <

.001. Wald Chi^2 statistics are presented for ACL models and Adjusted R^2 statistics are presented for WLS models.

a. Estimated coefficients for models of depressive symptoms are not directly comparable because of differences in the way the information used to construct this measure was collected across samples.

Table 4. Unstandardized Coefficients from OLS Regression (WLS) Models of Self-Rated Health or Depressive Symptoms on Reasons for Involuntary Job Loss and Selected Independent Variables.

	Self-rated Health		Depressive Symptoms	
	Model 6	Model 7	Model 6	Model 7
Job Loss Category				
[Omitted] No Job Loss (N = 4550)	--	--	--	--
Displacement (N = 979)	0.056*	--	0.106**	--
	(0.025)		(0.037)	
Firing/Layoff (N = 263)	-0.018	--	0.156*	--
	(0.045)		(0.065)	
Temporary/Seasonal Loss (N = 83)	0.139	--	0.336**	--
	(0.079)		(0.113)	
Business Failure (N = 31)	0.111	--	-0.023	--
	(0.123)		(0.174)	
Loss for Health Reasons (N = 309)	0.499***	0.498***	0.266***	0.266***
	(0.043)	(0.043)	(0.061)	(0.061)
Involuntary Job Loss, not for Health Reasons (N = 1356)	--	0.047*	--	0.127***
		(0.022)		(0.032)
N (Individuals)	6115	6115	5723	5723
Adj. R2	0.064	0.063	0.029	0.027

Notes: Coefficients obtained from linear regression models, with standard errors of estimates in parentheses, and significance levels denoted by * p < .05, ** p < .01, *** p < .001. Models 6 and 7 adjust for all covariates included in Model 5, presented in Table 3.

Table 5. Unstandardized Coefficients from GEE Linear Regression (ACL) Models of Self-Rated Health or Depressive Symptoms on Ordering of Involuntary Job Loss and Health Shocks and Selected Independent Variables.

	Self-rated Health		Depressive Symptoms	
	Model 8	Model 9	Model 8	Model 9
Job Loss Category				
[Omitted] No Job Loss, No Health Shock (N = 2669)	--	--	--	--
Health Shock Only (N = 806)	0.404***	0.403***	0.206***	0.206***
	(0.042)	(0.042)	(0.038)	(0.038)
Health Shock, Then Job Loss or Indeterminate Timing (N= 89)	0.519**	0.517***	0.468***	0.468***
	(0.132)	(0.132)	(0.128)	(0.128)
Job Loss, Then Health Shock (N=41)	0.567***	--	0.176	--
	(0.145)		(0.121)	
Job Loss Only (N=237)	0.086	--	0.156*	--
	(0.063)		(0.067)	
Involuntary Job Loss, not for Health Reasons (N=278)	--	0.157**	--	0.159**
		(0.060)		(0.060)
N (Observations)	3842	3842	3816	3816
N (Individuals)	1778	1778	1776	1776
Wald Chi^2	1162.7***	1161.8***	761.1***	758.1***

Notes: Coefficients obtained from GEE linear regression models, with standard errors of estimates in parentheses, and significance levels denoted by * $p < .05$, ** $p < .01$, *** $p < .001$. Models 8 and 9 adjust for all covariates included in Model 5, presented in Table 3.

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[i] 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 impacts 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). Alternatively, workers who lose a job they did not enjoy, or that was dangerous or stressful, may have better outcomes than do workers for whom the job enhanced a healthy lifestyle and was a source of satisfaction (Wheaton 1990). The present analysis is focused on disentangling the contributions of social causation and social selection to the relationship between involuntary job loss and health, so we do not directly engage the issue of differential vulnerability.

[ii] WLS project leaders conducted a new round of surveys in 2003-2005 with the surviving original cohort members and their randomly selected siblings; members of the original graduate sample were 64-66 years old when they were surveyed. These data were not yet available at the time this analysis was conducted.

[iii] We present health outcome measures for eligible respondents in the 2001/2 wave of the ACL survey and predictors from baseline, but health outcome measures and predictor variables from 1989 and 1994 are also considered in the data analysis strategy outlined below.

[iv] Some of the non-health measures were retrospective reports actually collected from respondents in 1992/3, but pertain to a respondent's first job spell over the period 1975-1992.

[v] Standardizing is performed at each wave based on the distribution for the entire sample at baseline, so that comparison of scores within individuals across waves of the survey is not compromised by sample attrition or mortality.

[vi] For the approximately 10% of individuals who had more than one involuntary loss over this period, we considered the reason associated with the first loss. Adjustment for the differential length of follow-up across samples is discussed below. 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, as well as creating separate categories for respondents who lost a job only once, versus more than once, over follow-up. Our main substantive findings were not appreciably altered by these adjustments.

[vii] There was only one case of involuntary job loss as a result of imprisonment. This case was included in the main analysis but not included in the final WLS model that examines separate reasons for job loss.

[viii] There were not enough respondents of other racial/ethnic backgrounds in the ACL sample to construct additional race categories for the analysis; the ACL was constructed to represent the 1986 United States population, when the proportions of other racial/ethnic minority groups were lower than today.

[ix] In the started log transformation, a small positive constant is added to each respondent's yearly earnings or occupational education score before taking the log, so that individuals with a score of zero on the measure are retained.

[x] In a small number of ACL cases, respondents were working at a given wave but did not provide information about their working characteristics at that time. Measures were imputed for annual earnings (6.9% of otherwise eligible observations) and occupational standing (3.0% of otherwise eligible observations) using regression-based linear multiple imputation with STATA 8.0SE software. Missing observations for private employer (1.7% of otherwise eligible observations) and/or goods-producing industry (5.1% of otherwise eligible observations) were assigned for a given person-spell based on the values for earlier or later spells for that individual, and where other information was not available, respondents were assigned to public employer and non-goods-producing industry as these were the hypothetically less-risky categories. Dichotomous control variables indicating missing data on these

measures were created and included in all analytic models; the estimated coefficients associated with these indicators are not reported as they were generally not statistically significant.

[xi] In the analysis, we include indicator variables for the person-spell under observation (1986-1989, 1989-1994, or 1994-2001), and whether the respondent ever died over follow-up. The indicator of mortality at some time over follow-up separates losses to follow-up that occur due to mortality (N=58) versus those occurring because of survey non-response (N=272), which we expect to be associated with different selection mechanisms.

[xii] To estimate a set of comparable models across both samples, person-spells from the ACL were included in the main analysis when the respondent reported working in the paid labor force in the baseline year for a particular spell (e.g., in 1986, 1989, or 1994), so that we had information on their working conditions at the baseline for each period of observation. However, some respondents entered work after the baseline year for a particular spell and were at risk for an involuntary job loss for that spell, but these person-spells are omitted from the main analysis. Between 11% (n = 26, 1994-2001/2) and 19% (n = 35, 1986-1989) of the involuntary job losses in a given spell occurred among individuals who did not report working in the baseline year of that person-spell. To assess the impact of omitting these losses from consideration, 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 any of the survey years. These results were similar to the main findings, so omitting these cases does not appear to affect our conclusions.

[xiii] In the WLS sample, 576 respondents died before follow-up in 1992/3 and 1414 failed to respond to the phone and mail surveys in that wave. Among the remaining eligible respondents, for those who were not interviewed in 1964, information was imputed for measures of parents' income (4.93% of otherwise eligible observations) and household head's occupational status (0.98% of otherwise eligible observations).

[xiv] Particularly for the smaller ACL sample, the number of involuntary job loss events becomes relatively small when models are estimated separately by sex, and more robust results are obtained using an analytic sample that pools over both sexes. Results from models estimated separately by sex are available from the authors upon request.

[xv] The use of the person-spell observations makes full use of all information for respondents who were missing at one or more waves of the study by using data prior to, or following, the survey wave at which they did not respond.

[xvi] We also estimated ordered probit models for self-assessed overall health with the WLS sample, but the results were substantively the same as those obtained using OLS regression, so we report the OLS regression results here for consistency with the ACL models.

[xvii] Sex interaction terms were checked by comparing the coefficients for the variable of interest in models stratified by sex, and the overall sex difference was obtained by comparing the predicted likelihood of involuntary job loss for men and women, controlling for all covariates in the model (not shown here).

[xviii] This difference may reflect the overall greater likelihood for males to be working for pay at any time. Since the length of the person-spells increases over time (approximately 2.5 years, 5 years, and 7.5 years, respectively), the overall likelihood that a woman is working for pay and at risk of an involuntary job loss is greater during the longer intervals.

[xix] To further explore health selection into involuntary job loss, we estimated two simpler models among ACL respondents that controlled for either self-rated health or depressive symptoms at baseline and other predictors in Model 1, but omitted measures of socioeconomic position (education, annual earnings), marital status, and working conditions (private sector, goods-producing industry, occupational standing) (results not shown here). Our baseline measures of health might not show an association with the risk of a subsequent involuntary job loss if the effect of prior health is already reflected in baseline socioeconomic achievement and success in the marriage and employment markets. In these simpler

models, self-rated health is significantly positively associated with involuntary job loss among women, while it is not among men. Depressive symptoms are weakly positively associated with the risk of an involuntary job loss for ACL men and women.

[xx] The control for reported health at an earlier wave adjusts both for differences in the prior health of people who did and did not experience a job loss, and also for individual idiosyncrasies in the way people report about their health.

[xxi] The effect of adding an indicator for baseline health differed slightly for ACL men and women. ACL men with poor self-rated health at baseline are, if anything, less likely to involuntary lose a job over follow-up, while women in poor health are more likely to experience a job loss than their healthier counterparts, as discussed above. This means that when we control for these opposite patterns of health-based selection at baseline, the estimated effect of an involuntary job loss on health increases somewhat for men, while it declines somewhat for women. There is no such difference in the models of depressive symptoms because there is no sex difference in the way that depressive symptoms influence the likelihood of involuntary job loss. We estimated a series of models to test whether in general, selection into and out of the labor force on the basis of physical health works similarly for both men and women in the ACL as in other studies that test for health selection (Arrow 1996).We estimated models of the odds of entry and exit from the paid labor force using the same set of covariates as in the main analysis and found that as baseline self-rated health declines, the odds of subsequently leaving the labor force increase and the odds of entering paid work decline, with no differences by sex (results not shown). These findings reassure us that our conclusions about the relationship between self-rated health and involuntary job loss are not due to unique characteristics of the ACL sample, as well as suggesting further attention to the differences in selection mechanisms underlying involuntary job loss versus labor force exit.

[xxii] The definition of a "serious" or "life-threatening" life event was left to the respondent, so there may be some variation in the objective severity of the event; however, in the present analysis we assume that any self-reported serious or life-threatening event could potentially impact an individual's ability to continue at her present paid job. In analyses not shown here, we found that changes in self-rated health over time were strongly related to self-reported incidence of serious chronic conditions among ACL respondents.

[xxiii] This category contains all identifiable cases where the involuntary job loss may have occurred for health-related reasons. Our system of categorization is conservative because there are undoubtedly some individuals included in this group for whom a job loss actually preceded a health shock, but due to missing data on the timing of events, we have included them in the final category as cases of health selective job loss. Appendix A presents results from Models 10 and 11 (replicating Models 8 and 9), where the cases of indeterminate timing were reassigned to the "job loss clearly preceding a health shock" category. These results show that the effects of a job loss followed by a health shock rise under this specification, particularly for depressive symptoms. The true impact of these two scenarios: job losses preceded by a health shock, and job losses followed by a health shock, probably lie somewhere between the estimates shown in Table 5 and Appendix A.

[xxiv] This modeling strategy also partially adjusts for the fact that the duration since job loss could be longer among WLS respondents (up to 18 years) than for ACL respondents (up to 7.5 years), and that the durations of different ACL person-spells (e.g., 1986-1989, 1989-1994) varied from about 3 to about 7.5 years.

[xxv] These other baseline health characteristics, not surprisingly, have independent effects on later health, even though they are strongly correlated with one another. Self-rated health is predicted by baseline self-rated health, depressive symptoms, smoking, body mass index, and engaging in exercise or sports. Depressive symptoms are predicted by baseline self-rated health and depressive symptoms.

[xxvi] This difference is likely due to the reduction in the number of involuntary job loss events observed and because greater declines in self-rated health are observed in the 1994-2001 period than in earlier periods, as ACL respondents start to age. There also is likely to be a greater time lag for pathogenesis between a job loss event and an observable effect on self-rated overall health than on depressive symptoms.