Published in final edited form as:
J Gerontol B Psychol Sci Soc Sci. 2006 July ; 61(4): S221–S228.

The Persistence of Depressive Symptoms in Older Workers Who Experience Involuntary Job Loss: Results from the Health and Retirement Survey

William T. Gallo[1], **Elizabeth H. Bradley**[1], **Joel A. Dubin**[1], **Tracy A. Falba**[1], **Hsun-Mei Teng**[1], and **Stanislav V. Kasl**[1]
1*Department of Epidemiology and Public Health, Yale University School of Medicine*

Richard N. Jones[2]
2*Hebrew Rehabilitation Center for the Aged, Boston*

Abstract

Objectives: The purpose of this study was to investigate whether involuntary job loss among workers nearing retirement was associated with long-term changes in depressive symptoms.

Methods: Analyzing data from the first four waves (1992-1998) of the Health and Retirement Survey (HRS), we used longitudinal multiple regression to assess whether involuntary job loss between the first two waves of the Survey was associated with depressive symptoms at Wave 3 and Wave 4. The study sample included 231 workers who experienced job loss in the Wave 1-Wave 2 interval and a comparison group of 3,324 non-displaced individuals. The effect of job loss on depressive symptoms was analyzed both in the full study sample and in subsamples determined by wealth.

Results: Among individuals with below median net worth, Wave 1-Wave 2 involuntary job loss was associated with increased depressive symptoms at Wave 3 and Wave 4. No effect of involuntary job loss was found for high net worth individuals at the later survey waves.

Discussion: Our findings have identified older workers with limited wealth as an important group for which the effect of involuntary job separation in the years preceding retirement potentially results in enduring adverse mental health.

INTRODUCTION

A considerable body of research has concluded that involuntary job loss is a salient life event capable of producing an acute adverse psychological response, primarily in the form of subclinical symptomatology (Brenner & Starrin, 1988; Frese & Mohr, 1987; W. T. Gallo, Bradley, Siegel, & Kasl, 2000; Kaplan, Roberts, Camacho, & Coyne, 1987; Warr & Jackson, 1985). Two previous studies (W. T. Gallo et al., 2000; Siegel et al., 2003) have examined mental health impacts of job loss among workers nearing retirement using the Health and Retirement Survey (HRS), demonstrating increases in depressive symptoms in the initial follow-up after separation (W. T. Gallo et al., 2000). Little is known, however, about the longer-term psychological consequences of job loss among older workers. Understanding the longer-term impact of job loss on psychological health among older workers is important, as persistent depression and its associated chronic stress have been linked to a multitude of harmful outcomes in this age cohort, including impaired immune function (Maes, Bosmans, & Meltzer, 1995; Reiche, Nunes, & Morimoto, 2004), coronary heart disease (Sesso, Kawachi, Vokonas,

Address Correspondence to: William T. Gallo, Ph.D. Department of Epidemiology and Public Health, Yale University School of Medicine, One Church Street, 7th Floor, New Haven, CT 06510. E-mail: william.gallo@yale.edu.

& Sparrow, 1998; Rozanski, Blumenthal, & Kaplan, 1999), and increased risk of mortality (Bruce, Leaf, Rozal, Florio, & Hoff, 1994).

There are numerous reasons why older workers may be at risk for long-term depression following involuntary job loss. As displaced older workers are often not yet age-eligible for private pension payouts and Social Security benefits, such individuals may face considerable financial distress in the period of unemployment, during which they may lose both income and non-cash benefits, such as health insurance. Perhaps more importantly, older unemployed individuals may encounter limited reemployment prospects (Hipple, 1999), and when they do secure new positions, may suffer severe wage losses (Couch, 1998; Hipple, 1999), diminished occupational status, loss of seniority, and reduced health and pension benefits (Beckett, 1988). What is more, job loss severs workplace-identity factors (Joelson & Wahlquist, 1987), including social status and interaction (Iversen & Klausen, 1986; Jahoda, 1981), and disrupts the balance of time devoted to labor and leisure, which can contribute to family distress (Siegel, Bradley, Gallo, & Kasl, 2003). Finally, late-career unemployment interrupts the accumulation of wealth that will support consumption during retirement, which is especially important, given evidence that a considerable share of wealth accrual occurs in the decade prior to retirement. (Bernheim, 1997; Mitchell & Moore, 1998).

Enduring effects of a significant life experience, sometimes referred to as "scarring" (Oldehinkel, Van Den Berg, Bouhuys, & Ormel, 2003; Wilhelm, Parker, Dewhurst-Savellis, & Asghari, 1999), have been studied by investigators in a variety of disciplines, most notably economics. The majority of economic research has documented the long-term effect of unemployment on wages, life-time earnings, and future employment likelihood (Arulampalam, 2001; Chan & Huff Stevens, 2001; Huff Stevens, 1997; Ruhm, 1991). In addition, some recent research has assessed non-pecuniary (life satisfaction and self-esteem) scarring (Clark, Georgellis, & Sanfey, 2001; Goldsmith, Veum, & William Darity, 1996; Winkelmann & Winkelmann, 1998).

Using data from the HRS, in this study we consider whether involuntary job loss between the first two waves (1992 and 1994) of the Survey is associated with depressive symptoms at Wave 3 (1996) and Wave 4 (1998). Although we assume it unlikely that all individuals who experience involuntary job loss will exhibit elevated depressive symptoms attributable to the distant job loss several years after exposure, we posit that the most economically vulnerable job losers will be affected in the long-term. We hypothesize that displaced workers of lower socioeconomic standing will provide evidence of long-term mental health scarring. We anticipate that the putative long-term increase in depressive symptoms will be detectable in these strata, even after adjusting for a wide range of potentially confounding and moderating influences.

METHODS

Study Design & Data

This prospective analysis uses data from the first four waves (1992, 1994, 1996, and 1998) of the Health and Retirement Survey. The HRS is a national, longitudinal survey designed to investigate the experiences of older workers as they proceed into retirement, with particular emphasis on trajectories of health and well-being. The HRS is well suited for this research because of its large sample size, national representation, and unprecedented combination of data on employment and health among older adults.

HRS data are collected at two-year intervals, and collection of 12 waves of data is planned. At the 1992 baseline, the HRS included a sample of 12,521 participants (response rate = 81.7%). In-home, face-to-face interviews were taken from individuals born between 1931 and 1941

and their spouses. Certain subgroups (Blacks, Hispanics, and Florida residents) were oversampled. At all subsequent survey dates, respondents were interviewed by mail or telephone. The number of subjects who were re-interviewed and the corresponding response rates are: Wave 2 (11,596 interviews, response rate = 89.1%); Wave 3 (11,200 interviews, response rate = 86.5%); Wave 4 (10,856 interviews, response rate = 84.4%). HRS data collection is conducted by the Institute for Social Research at the University of Michigan, and the Survey is principally funded by the National Institute on Aging. The HRS is described in greater detail elsewhere (Juster & Suzman, 1995).

Analysis Sample

The sample analyzed in this study consists of individuals who experienced involuntary job loss between Waves 1 and 2 of the Survey and a comparison group of workers who were not displaced in the Wave 1-Wave 2 interval. To be eligible for our analysis, individuals had to be at risk for job loss at the 1992 baseline interview. At-risk individuals comprised those in the HRS birth cohort (51-61 years at baseline) who reported working for pay, and who were not self-employed (n = 4,730). From the at-risk group, we first eliminated 732 individuals (15.5%) who did not respond to one or more of the follow-up surveys, leaving a potential sample of 3,998. We then ascertained the extent of data missing due to non-response. Three-hundred, seventy-eight (9.5%) lacked follow-up data necessary to construct the depressive symptoms outcome variables, and 271 (6.7%) were missing one or more components of the physical function control. The remaining missing (64 records, 1.6%) data were distributed across the other explanatory variables. Because of its importance in predicting depressive symptoms, physical function was imputed, when missing, using a multiple imputation procedure based on established risk factors for physical functioning (Stuck et al., 1998) included in the HRS data. The final sample numbered 3,555 individuals, of which 231 experienced involuntary job loss between Wave 1 and Wave 2 of the survey.

We compared respondents who were excluded because of missing data to members of the analytic sample by means of either a t-test, for continuous variables, or a chi-square test, for categorical variables. Although the two groups were similar in the majority of attributes, survey participants excluded because of missing data were, on average, less educated ($p < .01$), more likely to be male ($p < .01$), non-white ($p < .05$), married ($p < .01$), and work in a blue collar occupation ($p < .01$) than members of the analysis sample.

Measures

Outcome Measure—The outcome variable in this study was a summary measure of depressive symptoms, assessed at Waves 3 and 4 of the Survey. The measure of depressive symptoms was based on the shortened form (8 items) of the 20-item Center for Epidemiological Studies-Depression (CES-D) scale (Radloff, 1977). Of the eight CES-D-8 items, six negatively phrased statements reflect the presence of depressive symptoms (respondent felt depressed; felt everything s/he did was an effort; experienced restless sleep; “could not get going”; felt lonely; felt sad), and two positively phrased statements suggest the absence of depressive symptoms (respondent enjoyed life; was happy).

The response metric for the items comprising the depressive symptoms measure was modified between the baseline (1992) survey and later administrations. This change was instituted both to ease participant burden and facilitate symptom response via telephone interview. At the baseline, HRS interviewers offered respondents a range of frequency in the occurrence of each item, represented by the 4-point response, whereas in later waves, the range of frequency was limited by modifying the stem of the question, so that respondents were presented with a 2-point response.

To illustrate, consider the symptom of *feeling depressed*. At the Wave 1 interview, participants were asked: *tell me how often you have experienced the following feelings during the past week--all or almost all of the time, most of the time, some of the time, or none or almost none of the time. During the past week, I felt depressed.* At the Wave 2 interview and all subsequent interviews to date, subjects were asked: *Now think about the past week and the feelings you have experienced. Please tell me if each of the following was true for you much of the time during the past week. Much of the time during the past week, you felt depressed. Would you say yes or no?*

Although the symptom being assessed was identical across waves, elicited frequency varied. Research conducted by HRS investigators, summarized in a project technical report (Steffick, 2000), concluded that there is no simple conversion between the baseline response scale and that used at later waves. To overcome this lack of comparability, in recent work we applied an item-response theory based linking algorithm to generate equated depressive symptom scores for each respondent at each wave (Jones, 2001; Jones & Fonda, 2004). The resulting equated depressive symptoms scores are used in this study. A full discussion of the equating algorithm and associated technique is included in Jones & Fonda, 2004.

The equated measure has a baseline mean of 0.075 (SD = 0.57; range -0.43 to 2.33). It includes a substantially broader range of values than the unequated (0-8) measure, with asymmetric non-integer intervals between values. Consistent with the underlying unequated (0-8) depression score, the distribution of equated scores is non-normal, with 48% of the values at baseline clustered at the minimum. Efforts to normalize the equated variable (e.g., log transformations, change scores, t-transformations) proved ineffective. Methods designed to accommodate non-Gaussian count data were deemed to be incompatible with the equated depression measure, because of its non-integer intervals.

The reliability of the 8-item depressive symptoms measure underlying the equated measure was investigated both in our earlier, two-wave research (W. T. Gallo et al., 2000), and the recent HRS report (Steffick, 2000). Cronbach alpha coefficients computed by Steffick (2000) for the first three waves of data were 0.84, 0.83, and 0.81, suggesting adequate internal consistency. The factor structure of the 8-item measure was also evaluated in our earlier study (W. T. Gallo et al., 2000). Our findings, consistent with those of the majority of studies, indicated unidimensionality, or one underlying concept present in the depressive symptoms score, supporting our decision to use an aggregate score.

Independent Variables

Exposure Variable: Involuntary Job Loss—Involuntary job loss was defined as the loss of a job due to business/plant closing or layoff, and was represented by a binary variable, where 1 indicated involuntary job loss between Waves 1 and 2 of the Survey, and 0 indicated the absence of involuntary job loss in the same interval.

Other Explanatory Variables—Covariates from a number of domains were included in our models. Factors were selected based on existing evidence of their association with depressive symptoms (Dooley & Prause, 2004; J. J. Gallo, Royall, & Anthony, 1993; W. T. Gallo et al., 2000; Link & Dohrenwend, 1989; Penninx et al., 1998). Time-invariant factors were fixed at the 1992 study baseline, whereas variables in which changes could alter the job loss-depressive symptoms relationship were updated at each survey wave. Employment status design variables, which were used to account for labor force transitions, were also measured concurrently with the outcomes.

Time Invariant Factors: Variables fixed at the study baseline comprised: age (in years), sex (1 = female), race (1 = White), education (in years), and insurance status (1 = public or private

health insurance); labor income, non-housing net worth, and occupation class (white collar v. blue collar); and Wave 1 depressive symptoms. Blue-collar occupations included farming, forestry, and fishing; production and operations; and military; white-collar occupations included managerial and professional; sales, clerical, and administrative; and service occupations. Income included pre-tax individual labor earnings for 1991, and was dichotomized at its median value of $25,000 (1 = income > median). Net worth consisted of the sum of household non-housing asset amounts reported by respondents at the 1992 survey: 1992 values of checking and savings accounts; certificates of deposit, bonds, and Treasury bills; individual retirement accounts; stock and mutual funds; vehicles; business equity; equity in real estate other than respondents' primary assets; and other reported non-housing assets. Net worth was dichotomized at its median value of $38,000 (1 = net worth > median). Both income and net worth were dichotomized at the median to maximize statistical power for analysis of effect modification.

Time-varying Factors: Variables updated at each survey wave included: marital status (1 = married or partnered); self-reported alcohol use (1 = respondent drinks), tobacco use (1 = respondent smokes), and physical activity (1 = respondent reports vigorous activity 3 or more times per week); self-reported, heart attack myocardial infarction (MI), non-skin cancer or malignant tumor, and stroke (1 = physician told respondent s/he had condition); obesity (1 = obese), which was determined as a calculated body mass index of at least 30 (Flegal, Carroll, Kuczmarski, & Johnson, 1998); and physical function (1 = function score > median), derived from self-reports of difficulty with 14 tasks (mobility, strength, and basic activities of daily living). The function measure was adapted from previous work on this cohort (W. T. Gallo et al., 2000). Higher values reflect more impaired function.

Employment status variables were used to capture job status changes between survey waves, the importance of which has been highlighted in recent research (Dooley & Prause, 2004; Dooley, Prause, & Ham-Rowbottom, 2000; Grzywacz & Dooley, 2003). Measured concurrently with the outcomes, these variables account for both returns to work among the unemployed, which have been linked to changes in psychological health (Claussen, 1999; Dooley & Catalano, 1988; W. T. Gallo et al., 2000; Kessler, Turner, & House, 1988, 1989; Warr & Jackson, 1985), and other labor force transitions. Represented by 4 dummy variables, which apply to all sample members regardless of Wave 1-Wave 2 job loss category, employment status controls indicate full-time employment (referent category), part-time employment, nonemployment, and retirement.

Relationships among Explanatory Variables—We ran standard diagnostic analyses to investigate collinearity of explanatory variables in the final models. Pairwise variable correlations were first examined. Next, we assessed variance inflation factors, which reveal higher order collinear relationships not detectable in simple correlation analysis. The diagnostic results indicated a collinear relationship between pain and physical function. Pain was thus omitted from final set of explanatory variables.

We also tested for endogeneity of our exposure, finding no evidence of this potential source of bias. In particular, we were concerned that job loss was determined by Wave 1 depressive symptoms, a lagged measure of the outcome variables. This concern was motivated by our finding that, in the stratum of low net worth individuals, Wave 1-Wave 2 job losers had significantly ($p < .05$) higher baseline depressive symptoms than members of the comparison group. To exclude the possibility that this baseline difference translated to biased estimates of the effect of job loss on later depressive symptoms, we used a Hausman Specification test (Hausman, 1978) for endogeneity, a two-stage instrumental variable procedure. In the first stage, we estimated involuntary job loss as a function of baseline depressive symptoms, all exogenous explanatory variables, and an instrumental variable. The instrumental variable was

a dummy variable specifying the geographic region (South/Midwest v. other regions) in which the participant lived. In the second step, we regressed our outcomes on job loss, baseline depressive symptoms, all exogenous variables, and a supplemental regressor, created from the residuals of the potentially endogenous variable (job loss) in the first step. The test results did not indicate endogeneity of involuntary job loss.

Analyses

We used longitudinal multivariable regression to evaluate whether the effect of job loss between Waves 1 and 2 of the Survey on depressive symptoms was measurable at 4-year and 6-year follow-up. Wave-specific models estimated follow-up depressive symptoms (Wave 3 or Wave 4) as a function of Wave1-Wave 2 involuntary job loss, Wave 1 depressive symptoms, and adjustment variables. By covarying the outcomes with their lagged (Wave 1) values we created a measure of residualized change (Cronbach & Furby, 1970).

We initially fit wave-specific, adjusted models for the full sample of participants. Among the full sample, we then tested for effect modification, to explore subgroup differences in the response to involuntary job loss. As we hypothesized that the most economically vulnerable sample members would be particularly susceptible to mental health scarring, we tested for variation in the response to job loss across socioeconomic strata by interacting a number of indicators of socioeconomic standing, including health insurance status, labor income, marital status, and household non-housing net worth with the job loss variable. Several studies (Broman, Hamilton, Hoffman, & Mavaddat, 1995; Dooley & Prause, 2004; Hamilton, Broman, Hoffman, & Renner, 1990; Turner, 1995) have also described differential responses to the experience of losing a job, either across demographic or socioeconomic groups. Since our findings revealed a differential response to job loss between individuals below and above the median of non-housing net worth, we stratified the sample, and re-fit the wave-specific models of job loss separately in the subsamples. We found no evidence of group-level variation in the effect of job loss for the remaining proxies.

All analyses were weighted to correct for the HRS oversampling of relevant sub-groups. Data were weighted by the person-level analysis weight, provided by the HRS, adjusted for the study's sample size.

RESULTS

Descriptive Results

Table 1 provides descriptive statistics (weighted means) on the analytic sample. At baseline, sample members averaged 55 years of age (range: 51-61) and 13 years of schooling. Eighty-six percent of sample members were white, 74% were married, and just over half were female. Over three-quarters worked in white-collar occupations, with average (median) labor income and non-housing net worth of $25,000 and $38,000, respectively. Sixty-eight percent reported some alcohol use, and just less than one-fourth reported tobacco use; 14% indicated vigorous physical activity three or more times per week. Reported prevalence of cancer, MI, and stroke were 5%, 4%, and 2%, respectively. Roughly one-fifth of sample members were classified as obese based on calculation of body mass index, and about two-thirds reported difficulty with one or more physical functioning tasks.

Multivariable Regression Results

Wave 3 (4-year) follow-up—Table 2 displays fully adjusted models of the effect of Wave1-Wave 2 involuntary job loss on depressive symptoms at Wave 3. The results for the full sample demonstrate the differential effect of job loss between individuals above and below the median of non-housing net worth, indicating a significantly ($p < .01$) weaker effect of job loss on

depressive symptoms for participants reporting higher than median net worth than for those reporting lower than median net worth. In the subsample that includes only participants with non-housing net worth below the sample median, our results indicate that sample members who experienced job loss between Waves 1 and 2 had significantly ($p < .05$) higher depressive symptoms at Wave 3 than those who did not. In the subsample of individuals with net worth above the full sample median, we did not, however, find evidence of an effect of Wave 1-Wave 2 involuntary job loss on Wave 3 depressive symptoms.

Wave 4 (6-year) follow-up—Table 3 provides results of models that estimated the effect of Wave 1-Wave 2 involuntary job loss on depressive symptoms at Wave 4. The results for the full sample once again provide evidence of a significant ($p < .05$) differential impact of job loss by net worth. Our findings in the net worth subsamples are consistent with the Wave 3 results. Among the subgroup of individuals who report non-housing net worth below the sample median, we find significantly ($p < .01$) higher Wave 4 depressive symptoms in individuals who experienced Wave1-Wave 2 job loss than those who did not. Among participants who reported net worth above the sample median, the results do not indicate an effect of Wave 1-Wave 2 involuntary job loss on Wave 4 depressive symptoms.

DISCUSSION

This analysis used data from the Health and Retirement Survey to evaluate whether workers who were involuntarily unemployed between Wave 1 and Wave 2 of the HRS reported higher depressive symptoms at Wave 3 and Wave 4 than individuals who were not displaced in the Wave 1-Wave 2 interval. This study extends earlier work on the HRS (W. T. Gallo et al., 2000), which identified increases in depressive symptoms associated with Wave 1-Wave 2 involuntary job loss at the initial, Wave 2 follow-up. Our findings reveal that, among sample members with household wealth below the full-sample median, the impact of the Wave 1-Wave 2 job loss on depressive symptoms was discernible at both Wave 3 and Wave 4 after adjusting for a range of factors related to depression.

The results of this study are largely supportive of our hypothesis. That is, in finding that involuntary unemployment was associated with long-term depressive symptoms in a group of individuals with limited wealth, we confirm that workers of lower socioeconomic standing are predominantly affected by the experience of late-career job displacement. Of the several measures of lower socioeconomic standing assessed for interaction with job loss, net worth was, however, the only proxy that indicated group-level variation in the impact of job loss. This implies that wealth, a cumulative measure of life-time earnings, is more important in moderating the unemployment-depression relationship than more current measures of financial position. The importance of wealth may be a function of its liquid components, such as savings, which are necessary to avoid the consequences of economic deprivation during the jobless period.

Our findings are also fundamentally consistent with those of a similar study of younger workers (Goldsmith et al., 1996), which identified long-term depression associated with joblessness as the mechanism responsible for scarring of self-esteem. This study, which used 3 waves of data from the National Longitudinal Survey of Youth, found elevated depression levels among workers who reported both unemployment and time out of the labor force 2 waves after employment separation.

Economic studies have proposed that longer-term effects, or scarring, of job loss are primarily the result of reemployment in inappropriate or unstable positions, which carry higher risk of re-exposure to displacement (Arulampalam, Gregg, & Gregory, 2001). Related epidemiologic research has linked reemployment in inadequate jobs to elevated depression (Grzywacz &

Dooley, 2003), suggesting that post-displacement employment transitions may mediate the effect of unemployment on longer-term psychological health. Such a relationship may apply to our findings among lower net worth participants. These individuals, who typically possess modest savings and pension entitlements, and are thus less capable of financially sustaining their households during an extended period of unemployment, may be not be fully discriminating in considering new jobs during unemployment; they consequently accept unsuitable jobs, which ultimately influence their psychological well-being.

Descriptive analysis based on the follow-up surveys revealed that, in the low net worth stratum, individuals who reported part-time employment and who were displaced in the Wave 1-Wave 2 interval had significantly higher depressive symptoms than part-time workers who were not previously displaced, possibly suggesting a potential mediating effect of transitions to part-time employment. These descriptive findings could suggest that lower wealth individuals who were displaced in the Wave 1-Wave 2 interval were later involuntarily employed in part-time jobs, whereas the non-displaced more willingly accepted part-time positions as bridge employment to retirement. Formal testing did not, however, indicate a strong mediating influence. In supplementary analyses (results not shown), we used two-stage instrumental variable estimation to explore the role of part-time employment as a mediator between unemployment and longer-term depression in the lower net worth group. With the economic model of scarring as our basis, we first estimated follow-up part-time employment as a function of Wave 1-Wave 2 job loss, an instrument (age), and all exogenous variables, generating residuals. We then used the residuals from the first-stage model to instrument the potential mediator (part-time employment) in a second-stage model of follow-up (Wave 3 or Wave 4) depressive symptoms, otherwise specified in the same way as the models presented in Tables 2 and 3. The estimated coefficient of part-time employment (instrumented) was strongly non-significant in the second-stage model, providing no evidence of mediation.

The inability to definitively attribute the depression scarring in the low net worth group to post-displacement employment transitions may mean that the relationship between unemployment and depression is more multifaceted than that between unemployment and long-term economic outcomes. It may also be indicative of the data's shortcomings. No observational data set can capture the complete range of life events occurring after job loss that can influence mental health. Our methodology may also be somewhat responsible. By selecting a comparison group whose members are eligible to make all of the labor force transitions available to the experimental group (with the exception of Wave 1-Wave 2 involuntary job loss), we add substantial complexity to our model. Thus, while our sample selection minimizes the likelihood that our main findings are biased by a healthy worker effect—as would be the case if we used a comparison group of stably employed workers, which is common in shorter-term studies of job loss—it makes difficult the task of ascribing the long-term depression to any transition that is common to both exposed and non-exposed sample members. Future investigations should be directed toward more comprehensive modeling of the complex pathways to retirement in the setting of late-career job loss, building on earlier research efforts (Flippen & Tienda, 2000; Moen, 1996; Mutchler, Burr, Pienta, & Massagli, 1997; Szinovacz & Davey, 2004).

There are three potential limitations of note in this study. First, although we observe higher depressive symptoms at each follow-up among workers displaced within the first two HRS survey waves, we cannot know for certain whether the increase in depression that we attribute to job loss was actually sustained for the entire observation period. The term "scarring" must be interpreted in light of this shortcoming, which is common to all observational studies. Second, although the equated depressive symptoms data make possible the comparison of baseline depression to later measurements, they do not allow clinically meaningful implications from the results; the investigator, rather, is limited to the inference of statistically significant differences. Even so, the 8-item, unequated scale is, itself, an abbreviated version of the full

20-item CES-D battery, and having no conventional cut-point, is equally restricted in its clinical application. Finally, it is impossible to fully capture the complex set of pathways in and out of the labor force taken by the heterogeneous sample analyzed in this study. Our employment status controls are therefore an aggregate approximation of actual labor force transition behavior. Nonetheless, the HRS provides the best source of data for a study with objectives such as ours.

Notwithstanding its limitations, this study makes an important contribution to our understanding of the long-term effects of involuntary job loss in older workers. Our findings identify lower net worth individuals as a subgroup of older displaced workers at elevated risk for long-term depression following job loss, suggesting that the persistent impact of a stressful life event such as unemployment is most pronounced among the economically vulnerable. This has not previously been reported in the aging literature. Occupational and mental health therapeutic interventions should be targeted to these individuals.

ACKNOWLEDGMENTS

The authors thank Laura Cramer, Emily Cherlin, and Sin How Lim for their research assistance with this study. This work was supported in part by a grant from the Claude D. Pepper Older Americans Independence Center at Yale (#P30AG21342), and in part by a Career Development Grant from the National Institute on Aging (#K01AG021983).

REFERENCES

Arulampalam W. Is unemployment really scarring? Effects of unemployment experiences on wages. The Economic Journal 2001;111:F585–F606.

Arulampalam W, Gregg P, Gregory M. Unemployment scarring. The Economic Journal 2001;111:S577–S584.

Beckett JO. Plant closings: How older workers are affected. Social Work 1988;33:29–33.

Bernheim, BD. The adequacy of personal retirement saving. In: Wise, DA., editor. Facing the age wave. Hoover Institution Press; Stanford, CA: 1997. p. 30-56.

Brenner SO, Starrin B. Unemployment and health in Sweden: Public issues and private troubles. Journal of Social Issues 1988;44:125–140.

Broman CL, Hamilton VL, Hoffman WS, Mavaddat R. Race, gender, and the response to stress: Autoworkers' vulnerability to long-term unemployment. American Journal of Community Psychology 1995;23:813–842. [PubMed: 8638552]

Bruce ML, Leaf PJ, Rozal GP, Florio L, Hoff RA. Psychiatric status and 9-year mortality data in the New Haven Epidemiologic Catchment Area Study. American Journal of Psychiatry 1994;151:716–721. [PubMed: 8166313]

Chan S, Huff Stevens A. Job loss and employment patterns of older workers. Journal of Labor Economics 2001;19:484–521.

Clark AE, Georgellis Y, Sanfey P. Scarring: The psychological impact of past unemployment. Economica 2001;68:221–241.

Claussen B. Health and re-employment in a five-year follow-up of long-term unemployed. Scandinavian Journal of Public Health 1999;27:94–100. [PubMed: 10421716]

Couch KA. Late life job displacement. The Gerontologist 1998;38:7–17. [PubMed: 9499649]

Cronbach LJ, Furby L. How we should measure "change" -- or should we? Psychological Bulletin 1970;74:68–80.

Dooley D, Catalano R. Recent research on the psychological effects of unemployment. Journal of Social Issues 1988;44:1–12.

Dooley, D.; Prause, J. Settling down: Psychological depression and underemployment. In: Dooley, D.; Prause, J., editors. The social costs of underemployment. Cambridge University Press; Cambridge: 2004. p. 134-157.

Dooley D, Prause J, Ham-Rowbottom KA. Underemployment and depression: Longitudinal relationships. Journal of Health and Social Behavior 2000;41:421–436. [PubMed: 11198566]

Flegal KM, Carroll MD, Kuczmarski RJ, Johnson CL. Overweight and obesity in the United States: Prevalence and trends, 1960-1994. International Journal of Obesity and Related Metabolic Disorders: Journal of the International Association for the Study of Obesity 1998;22:39–47. [PubMed: 9481598]

Flippen C, Tienda M. Pathways to retirement: Patterns of labor force participation and labor market exit among the pre-retirement population by race, hispanic origin, and sex. Journal of Gerontology: Social Sciences 2000;55:S14–S27.

Frese M, Mohr G. Prolonged unemployment and depression in older workers: A longitudinal study of intervening variables. Social Science and Medicine 1987;25:173–178. [PubMed: 3660007]

Gallo JJ, Royall DR, Anthony JC. Risk factors for the onset of depression in middle age and later life. Social Psychiatry and Psychiatric Epidemiology 1993;28:101–108. [PubMed: 8378804]

Gallo WT, Bradley EH, Siegel M, Kasl SV. Health effects of involuntary job loss among older workers: Findings from the health and retirement survey. Journal of Gerontology: Social Sciences 2000;55:S131–S140.

Gallo WT, Bradley EH, Siegel M, Kasl SV. The impact of involuntary job loss on subsequent alcohol consumption by older workers: Findings from the health and retirement survey. Journal of Gerontology: Social Sciences 2001;56:S3–S9.

Goldsmith AH, Veum JR, William Darity J. The impact of labor force history on self-esteem and its component parts, anxiety, alienation and depression. Journal of Economic Psychology 1996;17:183–220.

Grzywacz JG, Dooley D. “Good jobs” to “bad jobs”: Replicated evidence of an employment continuum from two large surveys. Social Science and Medicine 2003;56:1749–1760. [PubMed: 12639591]

Hamilton VL, Broman CL, Hoffman WS, Renner DS. Hard times and vulnerable people: Initial effects of plant closing on autoworkers’ mental health. Journal of Health and Social Behavior 1990;31:123–140. [PubMed: 2102492]

Hausman J. Specification tests in econometrics. Econometrica 1978;46:1251–1271.

Hipple S. Worker displacement in the mid-1990s. Monthly Labor Review 1999;(July):15–32.

Huff Stevens A. Persistent effects of job displacement: The importance of multiple job losses. Journal of Labor Economics 1997;15:165–188.

Iversen L, Klausen H. Alcohol consumption among laid-off workers before and after closure of a Danish ship-yard: A 2-year follow-up study. Social Science and Medicine 1986;22:107–109. [PubMed: 3952525]

Jahoda M. Work, employment, and unemployment. American Psychologist 1981;36:184–191.

Joelson L, Wahlquist L. The psychological meaning of job insecurity and job loss: Results of a longitudinal study. Social Science and Medicine 1987;25:179–182. [PubMed: 3660008]

Jones RN. Course of depression among middle-aged and older adults. The Gerontologist 2001;41 (Supplement S1):72.

Jones RN, Fonda SJ. Use of an IRT-based latent variable model to link different forms of the CES-D from the Health and Retirement Study. Social Psychiatry and Psychiatric Epidemiology 2004;39:828–835. [PubMed: 15669664]

Juster FT, Suzman R. An overview of the Health and Retirement Study. Journal of Human Resources 1995;30:S7–S56.

Kaplan GA, Roberts RE, Camacho TC, Coyne JC. Psychosocial predictors of depression. Prospective evidence from the human population laboratory studies. American Journal of Epidemiology 1987;125:206–220. [PubMed: 3812429]

Kessler RC, Turner JB, House JS. Effects of unemployment on health in a community survey: Main, modifying, and mediating effects. Journal of Social Issues 1988;44:69–85.

Kessler RC, Turner JB, House JS. Unemployment, reemployment, and emotional functioning in a community sample. American Sociological Review 1989;54:648–657.

Link, BG.; Dohrenwend, BP. The epidemiology of mental disorders. In: Freeman, HE.; Levine, S., editors. Handbook of medical sociology. 4th ed.. Prentice Hall; Englewood Cliffs, NJ: 1989. p. 102-127.

Maes M, Bosmans E, Meltzer HY. Immunoendocrine aspects of major depression. Relationships between plasma interleukin-6 and soluble interleukin-2 receptor, prolactin and cortisol. European Archives of Psychiatry and Clinical Neuroscience 1995;245:172–178. [PubMed: 7669825]

Mitchell OS, Moore JF. Can Americans afford to retire? New evidence on retirement saving adequacy. Journal of Risk and Insurance 1998;65:371–400.

Moen P. A life course perspective on retirement, gender, and well-being. Journal of Occupational Health Psychology 1996;1:131–144. [PubMed: 9547042]

Mutchler JE, Burr JA, Pienta AM, Massagli MP. Pathways to labor force exit: Work transitions and work instability. Journal of Gerontology: Social Sciences 1997;52:S4–S12.

Oldehinkel AJ, Van Den Berg MD, Bouhuys AL, Ormel J. Do depressive episodes lead to accumulation of vulnerability in the elderly? Depression and Anxiety 2003;18:67–75. [PubMed: 12964173]

Penninx BW, Guralnick JM, Ferrucci L, Simonsick EM, Deeg DG, Wallace RB. Depressive symptoms and physical decline in community-dwelling older persons. Journal of the American Medical Association 1998;279:1720–1726. [PubMed: 9624025]

Radloff L. The CES-D Scale: A self-report depression scale for research in the general population. Applied Psychological Measurement 1977;1:385–401.

Reiche EM, Nunes SO, Morimoto HK. Stress, depression, the immune system, and cancer. The Lancet Oncology 2004;5:617–625. [PubMed: 15465465]

Rozanski A, Blumenthal JA, Kaplan J. Impact of psychological factors on the pathogenesis of cardiovascular disease and implications for therapy. Circulation 1999;99:2192–2217. [PubMed: 10217662]

Ruhm CJ. Are workers permanently scarred by displacements. American Economic Review 1991;81:319–324.

Sesso HD, Kawachi I, Vokonas PS, Sparrow D. Depression and the risk of coronary heart disease in the Normative Aging Study. The American Journal of Cardiology 1998;82:851–856. [PubMed: 9781966]

Siegel M, Bradley EH, Gallo WT, Kasl SV. Impact of husbands' involuntary job loss on wives' mental health, among older adults. Journal of Gerontology: Social Sciences 2003;58:S30–S37.

SteffickDDocumentation of affective functioning measures in the Health and Retirement Study2000Survey Research Center, University of MichiganAnn Arbor, MIhttp://www.umich.edu/~hrswww/docs/userg/index.htmlHRS/AHEAD Documentation Report DR-005

Stuck AE, Walthert JM, Nikolaus T, Bula CJ, Hohmann C, Beck JC. Risk factors for functional status decline in community-living elderly people: A systematic literature review. Social Science and Medicine 1998;48:445–469. [PubMed: 10075171]

Szinovacz ME, Davey A. Retirement transitions and spouse disability: Effects on depressive symptoms. Journal of Gerontology: Social Sciences 2004;59:S333–S342.

Turner JB. Economic context and the health effects of unemployment. Journal of Health and Social Behavior 1995;36:213–229. [PubMed: 7594355]

Warr P, Jackson P. Factors influencing the psychological impact of prolonged unemployment and of re-employment. Psychological Medicine 1985;15:795–807. [PubMed: 4080883]

Wilhelm K, Parker G, Dewhurst-Savellis J, Asghari A. Psychological predictors of single and recurrent major depressive episodes. Journal of Affective Disorders 1999;54:139–147. [PubMed: 10403157]

Winkelmann L, Winkelmann R. Why are the unemployed so unhappy? Evidence from panel data. Economica 1998;65:1–15.

Table 1.

Weighted Means of Selected Variables (*N = 3,555*)

Variable	Full Sample (N = 3,555)	Job Losers (N = 231)	Non Job Losers (N = 3,324)
Outcome Variables			
Wave 3 Depression Score	.06 (.60)	.18 (.64)	.05 (.59)
Wave 4 Depression Score	.18 (.63)	.33 (.71)	.17 (.62)
Exposure Variable			
Involuntary Job Loss	.07 (.25)	---	---
Baseline (Wave 1) Depressive Symptoms	.07 (.57)	.21 (.67)	.06 (.56)
Demographic Factors			
Age (in years)	55.45 (3.07)	55.70 (3.09)	55.44 (3.07)
Female Sex	.52 (.50)	.51 (.50)	.52 (.50)
White Race	.86 (.35)	.81 (.40)	.86 (.35)
Education (number of years)	12.98 (2.78)	12.52 (2.88)	13.02 (2.77)
Married	.74 (.44)	.67 (.48)	.74 (.44)
Socioeconomic Risk Factors			
Labor Income (in $US)[1]	25,000 (25,770)	20,000 (30,000)	25,000 (25,000)
Non-Housing Net Worth (in $US)[1]	45,000 (111,087)	24,200 (90,723)	46,200 (112,430)
White Collar Occupation	.76 (.43)	.70 (.46)	.76 (.43)
Covered by Health Insurance	.75 (.43)	.66 (.48)	.76 (.43)
Health Behaviors			
Current Smoker	.23 (.42)	.27 (.45)	.23 (.42)
Current Drinker	.68 (.47)	.66 (.48)	.68 (.47)
Physically Active	.14 (.35)	.14 (.35)	.14 (.35)
Medical/Physical Risk Factors			
History of Cancer	.05 (.22)	.03 (.18)	.05 (.22)
History of MI	.04 (.19)	.03 (.17)	.04 (.19)
History of Stroke	.02 (.12)	.03 (.16)	.01 (.12)
Obese (BMI ⩾ 30)	.21 (.40)	.20 (.40)	.21 (.40)
Physical Functioning Score[1]	1.00 (1.00)	1.00 (1.00)	1.00 (1.00)

Standard deviations in parentheses. Where variables are dichotomies, means represent weighted proportions.

[1] Median and inter-quartile range are presented.

Table 2.

Effect of Involuntary Job Loss on Depressive Symptoms: Wave 3 (4-Year) Follow-up

	Full Sample w/ interactions (n=3,555)	Low Net Worth Subsample (n=1,777)	High Net Worth Subsample (n=1,778)
Involuntary Job Loss (IJL)	.114 (.090)	.113* (.050)	−.061 (.052)
Net Worth > median	.003 (.020)	—	—
Labor Income > median	.002 (.022)	−.013 (.032)	.029 (.030)
Covered by Health Insurance	.018 (.024)	.050 (.033)	−.022 (.032)
Female Sex	−.036 (.023)	−.082* (.034)	.001 (.029)
Interactions			
IJL × Net Worth > median	−.214** (.074)	—	—
IJL × Labor income > median	.098 (.089)	—	—
IJL × Covered by Health Insurance	−.029 (.083)	—	—
IJL × Female Sex	−.013 (.082)	—	—
Control Variables			
Wave 1 Depressive Symptoms	.329*** (.016)	.349*** (.023)	.308*** (.024)
Age (in years)	−.012*** (.003)	−.007 (.005)	−.015*** (.004)
White Race	−.062* (.026)	−.065 (.034)	−.031 (.044)
Education (number of years)	−.026*** (.004)	−.030*** (.005)	−.019** (.006)
Married	−.132*** (.022)	−.148*** (.030)	−.124*** (.032)
White Collar Occupation	−.032 (.024)	−.033 (.034)	−.038 (.035)
Full-Time Employed	Ref.	Ref.	Ref.
Part-Time Employed	−.008 (.026)	.006 (.040)	−.026 (.034)
Retired	.056* (.025)	.096* (.039)	.020 (.032)
Not Employed	.163*** (.043)	.184** (.058)	.144* (.067)
Current Smoker	.060* (.023)	.060* (.032)	.056 (.035)
Current Drinker	−.039* (.019)	−.055* (.027)	−.024 (.026)
Physically Active	−.083*** (.018)	−.099*** (.027)	−.072** (.025)
History of Cancer	.098** (.034)	.128* (.055)	.073 (.044)
History of MI	.182*** (.040)	.149** (.054)	.221*** (.061)
History of Stroke	.026 (.055)	−.022 (.073)	.087 (.085)
Obese (BMI ≥ 30)	.003 (.022)	−.005 (.031)	.016 (.031)
Physical Functioning score > median	.149*** (.019)	.143*** (.029)	.155*** (.025)
Constant	1.120*** (.185)	.949*** (.269)	1.201*** (.258)

Table values represent estimated coefficient (standard error).

* p <.05;

** p < .01;

*** p < .001

Table 3.

Effect of Involuntary Job Loss on Depressive Symptoms: Wave 4 (6-Year) Follow-up

	Full Sample w/ interactions (n=3,555)	Low Net Worth Subsample (n=1,777)	High Net Worth Subsample (n=1,778)
Involuntary Job Loss (IJL)	.129 (.095)	.136* (.052)	.017 (.055)
Net Worth > median	−.025 (.022)	---	---
Labor Income > median	−.041 (.024)	−.015 (.034)	−.040 (.031)
Covered by Health Insurance	.022 (.025)	.043 (.034)	.014 (.033)
Female Sex	−.004 (.024)	−.038 (.035)	.016 (.031)
Interactions			
IJL × Net Worth > median	−.185* (.079)	---	---
IJL × Labor income > median	.120 (.094)	---	---
IJL × Covered by Health Insurance	.056 (.087)	---	---
IJL × Female Sex	−.116 (.086)	---	---
Control Variables			
Wave 1 Depressive Symptoms	.343** (.017)	.352** (.024)	.337** (.025)
Age (in years)	−.005 (.003)	−.005 (.005)	−.005 (.005)
White Race	−.118** (.028)	−.124** (.035)	−.095* (.047)
Education (number of years)	−.021** (.004)	−.023** (.006)	−.021* (.006)
Married	−.099* (.023)	−.107* (.031)	−.098 (.033)
White Collar Occupation	−.058 (.026)	−.071 (.036)	−.047 (.037)
Full-Time Employed	Ref.	Ref.	Ref
Part-Time Employed	−.040 (.027)	−.026 (.041)	−.053 (.035)
Retired	.054* (.024)	.046 (.037)	.050 (.032)
Not Employed	.109* (.051)	.248** (.068)	−.112 (.078)
Current Smoker	.081 (.025)	.068 (.034)	.084* (.038)
Current Drinker	−.016 (.020)	−.024 (.029)	−.007 (.028)
Physically Active	−.052* (.019)	−.115** (.029)	.001 (.026)
History of Cancer	.062 (.033)	.022 (.051)	.085* (.042)
History of MI	.070 (.040)	.035 (.054)	.099 (.061)
History of Stroke	−.003 (.052)	.007 (.072)	−.024 (.077)
Obese (BMI≥30)	−.020 (.022)	−.032 (.032)	.002 (.032)
Physical Functioning score > median	.192** (.020)	.229** (.031)	.162** (.027)
Constant	.508** (.196)	.851* .735*	(.287) (.275)

Table values represent estimated coefficient (standard error).

* p <.05;

** p <.01