Losing jobs and lighting up: Employment experiences and smoking in the Great Recession

Shelley D. Golden, Ph.D.

Department of Health Behavior, University of North Carolina at Chapel Hill, 364 Rosenau Hall, CB #7440, Chapel Hill, NC 27599-7440

Krista M. Perreira, Ph.D.

Department of Public Policy, University of North Carolina at Chapel Hill, 201 Abernathy Hall, CB #3435, Chapel Hill, NC 27599-3435

Abstract

The Great Recession produced the highest rates of unemployment observed in decades, in part due to particularly high rates of people losing work involuntarily. The impact of these job losses on health is unknown, due to the length of time required for most disease development, concerns about reverse causation, and limited data that covers this time period. We examine associations between job loss, employment status and smoking, the leading preventable cause of death, among 13,571 individuals participating in the 2001-2011 waves of the U.S.-based Panel Study of Income Dynamics. Results indicate that recent involuntary job loss is associated with an average 1.1 percentage point increase in smoking probability. This risk is strongest when people have returned to work, and appears reversed when they leave the labor market altogether. Although some job loss is associated with changes in household income and psychological distress levels, we find no evidence that these changes explain smoking behavior modifications. Smoking prevention programs and policies targeted at displaced workers or the newly employed may alleviate some negative health effects produced by joblessness during the Great Recession.

1. Introduction

At the end of the Great Recession, one out of every ten people in the U.S. labor force wanted to work but could not find a job; unemployment rates were similar or higher in other countries (Bentolila, Cahuc, Dolado, & Le Barbanchon, 2012). In the majority of the U.S. cases, unemployment was the result of an involuntary job loss (Theodossiou & Hipple,

2011). Losing work or being unemployed is a stressful life event with potential negative ramifications for mental and physical health (Catalano et al., 2011) .

Measuring the impact of changing employment on health can be difficult, however, as many outcomes like chronic diseases take years to develop. Routine health-related behaviors can be more rapidly susceptible to employment shocks, and provide an early indication of future health needs. In this study, therefore, we explore whether involuntary job loss triggers short-term changes to smoking behavior, and whether this effect varies by employment status. Smoking is considered the leading preventable cause of mortality worldwide, killing 6 million people per year (World Health Organization [WHO], 2009). Smoking-related mortality risks accumulate over time and correlate with total tobacco exposure (US Department of Health and Human Services [DHHS], 2004), suggesting that all smoking transitions can impact health. More than 40% of U.S. adults report having smoked at least 100 cigarettes in their lifetime, and 18% of adults currently smoke on some or most days (Agaku, 2012). A recent national survey found that nearly 70% of current smokers want to quit, more than half made a quit attempt in the past year, but less than 7% succeeded (Malarcher, 2011).

Although smoking prevalence has decreased over the last few decades, progress has tapered, and U.S. smoking rates increased slightly during the height of the recession. In 2007, 19.8% of adults smoked regularly or periodically. This rate increased to 20.6% in 2008 and 2009. Although adult smoking prevalence fell to 19.0% in 2011 (Centers for Disease Control and Prevention [CDC], 2013), it remains well above the Healthy People 2020 goal of 12% (DHHS, 2011). Job losses in the recent downturn could explain some of this slowdown if they resulted in financial or emotional shocks to individuals which in turn impacted their smoking behaviors, especially if these shocks are sustained through longer periods of not working. Understanding whether and why smoking behavior changes following an involuntary job loss can help health professionals target smoking-related prevention and cessation resources, and better plan for the long-term health ramifications of economic downturns. We leverage repeated measures of employment experience and smoking from the 2001-2011 waves of the U.S.-based Panel Study of Income Dynamics (PSID) to assess relationships between recent employment experiences and smoking, and explore whether changes in family income or psychological distress explain these associations.

2. Previous research

Several studies have explicitly examined the impact of job displacement on smoking. Some analyses find higher odds of smoking among the unemployed, compared to the employed (De Vogli & Santinello, 2005; Prochaska, Shi, & Rogers, 2013), but these are cross-sectional studies. Consequently, they cannot rule out the possibility that smokers may be more likely to lose work, if employers view smoking as a negative quality in employees. Empirical work from Finland and Canada finds that unhealthy people are more likely to be displaced (Böckerman & Ilmakunnas, 2009; Jin, Shah, & Svoboda, 1995); studies from the U.S., Sweden and France find that smoking, especially among men, is associated with higher rates of abstenteeism (Leigh, 1996), sick leave (Lundborg, 2007) and future unemployment (Jusot, Khlat, Rochereau, & Serme, 2008). Estimates of the impact of

displacement on smoking could therefore be inflated if they fail to account for high selection of smokers into involuntary job loss.

Four studies to date have utilized panel data to measure impacts of job loss or unemployment on smoking. Using two waves of a national sample of older adults in the U.S., Falba and colleagues (2005) found that former smokers who lost work had more than twice the odds of relapsing, compared to their peers who remained working. Weden, Astone and Bishai (2006) explored 11 years of U.S. data and found evidence for a decreased likelihood of smoking cessation among the non-employed, but only for European American women. A study of Korean men found no statistically significant relationship between unemployment and smoking status, smoking intensity or quitting, but did find that the odds of re-initiating smoking was 66% higher among the unemployed compared to standard workers (Jung, Oh, Huh, & Kawachi, 2013). Finally, using eight waves of U.S. data, Arcaya and colleagues (2014) found that being unemployed nearly doubled the odds of men's smoking.

Each of these studies, however, has limitations which we aim to address. Two only analyze men's experience, and a third relies on data collected in the 1980s and 1990s. Although the fourth study uses more recent data, the last analyzed panel is from 2008, spanning the beginning, but not the end of, the recent economic crisis. During the Great Recession rates of all and long-term unemployment peaked, individuals spent more time looking for work, and by the end of 2009, more than 1% of U.S. residents who were outside the labor force indicated they were interested in working but had gotten discouraged from searching (Allegretto & Lynch, 2010; Theodossiou & Hipple, 2011). The income and psychological ramifications of involuntary job loss may have been particularly strong recently, especially among individuals who were unable to find work. Analyses in the current context, that also examine employment status following job loss, are needed to provide estimates of the impact of recent recessionary periods on smoking.

Additionally, some researchers argue that individuals who experience involuntary job loss or bouts of unemployment may differ in key, health-relevant ways from those who do not (Roelfs, Shor, Davidson, & Schwartz, 2011). Though previous longitudinal analyses controlled for reverse causation, none employed techniques to control for bias from unmeasured characteristics of individuals who lose their jobs, like a proclivity for risk-taking.

Finally, the studies we reviewed only assessed whether employment shifts or job losses are associated with smoking outcomes, and did not test the mechanisms which might mediate the relationships. Although governments and organizations can take actions to try to reduce job loss, there will always be people who experience it. A better understanding of how these shocks impact health behaviors can inform efforts to target prevention resources.

3. Two mechanisms through which job loss or employment may impact smoking

Job loss is associated with a decline in income, with effects persisting several years into the future (Ruhm, 1991; Stevens, 1997). As individuals lose income, economic theory suggests they decrease their purchase of all normal goods, including cigarettes. Individuals may quit smoking following a job loss, if they need limited resources elsewhere. As a result, job loss may be associated with decreased smoking probabilities. Even if individuals rely on savings to smooth their tobacco consumption behavior (Morduch, 1995), they may quit smoking if no additional work is found, and income losses are sustained. The nicotine found in tobacco products, however, is addictive for many people (Stolerman & Jarvis, 1995), perhaps making it difficult to quit smoking. At the same time, tests of rational addiction models find that people alter cigarette consumption in advance of a price change (Gruber & Koszegi, 2000); if the same is true for expected income declines, post-job loss responsiveness could be minimized. A meta-analysis finds that a one percent loss of income is associated with only a 0.28 percent short-run decrease in cigarette demand (Gallet & List, 2003).

Alternatively, involuntary loss of work may trigger higher levels of psychological distress, which could increase the likelihood that people smoke as a coping strategy. Several studies find that different dimensions of mental health decline following job loss (Brand & Burgard, 2008; Paul & Moser, 2009; Price, Choi, & Vinokur, 2002). Chronic stress, financial anxiety, depression and loss of self esteem may spur coping mechanisms, including unhealthy behaviors like smoking (Juster, McEwen, & Lupien, 2010; Shaw, Agahi, & Krause, 2011; Croghan et al., 2006). Work, however, might also be a source of stress, as well as behavioral coping responses, particularly if it requires long hours with little autonomy (Clougherty, Souza, & Cullen, 2010;(Clumeck et al., 2009; Virtanen et al., 2011; Escoto et al., 2010). If job loss reduces stressful employment conditions, unhealthy coping behaviors, including smoking, could decline.

4. Contributions

Our study contributes to the current literature in four ways. First, we capture smoking responses to employment experiences during a period that includes the Great Recession, providing an up-to-date estimate of some health impacts of the recent crisis. Second, we consider whether the impact of job loss differs if an individual subsequently finds work, allowing us to distinguish differences between job loss experience and employment status. Third, by using a large panel dataset and individual fixed effects models, we control for some unobserved confounders of the employment-smoking relationship. Finally, by incorporating measures of income and psychological distress, we begin to explore potential reasons why job loss might influence smoking, which could, in turn, help health professionals design more effective prevention and cessation resources.

5. Data and methods

5.1. Samples

Information about smoking behaviors, recent job losses, employment status, income, psychological distress and demographic characteristics are derived from the six waves of the nationally representative, longitudinal PSID administered biennially in the U.S. between 2001 and 2011 (Panel Study of Income Dynamics, 2014). In the PSID, the interviewee answers questions in reference to his or her own work, behavior and resources, as well as those for his cohabitating partner or spouse. In the six waves of data used for this analysis, 15,114 unique individuals were working in at least one wave, and were therefore potentially exposed to job loss. Since our analyses rely on multiple observations of each participant, we eliminated the 1,374 individuals (9%) who had only participated in one wave. An additional 169 respondents (1%) failed to provide key covariate information, and were dropped, resulting in a final full analytic sample of 13,571 individuals. Demographic information about the sample is available in Table 1.

One of the potential mediators we explore, psychological distress, was assessed only for the primary respondent, and was not included in the 2005 questionnaire. We therefore created a restricted sample for use when analyzing psychological distress, made up of those 7,769 individuals in the full analytic sample who reported emotional distress data more than once. Analyses indicate that individuals in the restricted sample were: significantly younger; had lower family incomes; were more likely to be women, African American, and single; and were more likely to have experienced bouts of unemployment or labor market departure during the analysis period, compared to the full sample. Smoking prevalence in each sample was similar.

5.2 Measures

The key outcome variable, smoking status, is measured dichotomously for each individual based on a question about whether the respondent (or his/her partner) currently smokes cigarettes. Previous research suggests that family member proxy reports of smoking status are reliable (Gilpin et al., 1994), and that self-reported smoking behavior corresponds to biochemical indicators of smoking (Patrick et al., 1994).

The PSID collects information about jobs that earned income for respondents and their partners in the two years prior to the survey, including the reasons that jobs ended. Recent involuntary job loss was measured dichotomously, based on whether an individual left a job in the last two years due to plant or company closure, layoff, firing or strike (=1), or quit work, retired, wanted a change, or remained in the same job (=0). Strictly categorizing job loss reasons as involuntary or voluntary is difficult; in sensitivity tests, therefore, we employed a dichotomous indicator of any job loss, regardless of reason. To examine job loss in the context of a respondent's current employment status, we created a six category *employment experience* variable based on different combinations of recent job loss experience (yes or no) and current employment status at the time of survey (employed, unemployed, out of the labor force).

To measure total family income, we use a PSID composite measure of the total taxable, transferable and social security income of all family unit members in the year prior to interview, adjusted to reflect real prices in 1999 using the Consumer Price Index-Urban, from the Bureau of Labor Statistics (BLS). We measure income in tens of thousands of dollars, and to account for negative values and skewness in the income distribution we add a small constant and employ a log transformation. We drop 15 observations of extremely high or low incomes (<−1.2 million; >30 million).

The PSID measures non-specific psychological distress of the respondent using the K6 scale (Kessler et al., 2002). The six items ask the respondent to indicate, how often, in the past thirty days, he or she felt sad, nervous, restless, hopeless, like everything was an effort, and worthless. Likert responses to these items are summed to create a scale. High scores indicate high levels of psychological distress.

To control for time-varying characteristics in our fixed-effect models, we include measures of a participant's age (linear and quadratic) and partnership status (cohabitating with a spouse or partner vs. not cohabitating), as well as the unemployment rate in the respondent's state during the three months prior to the survey, a survey year indicator, and an indicator for whether a participant was the respondent or partner of a respondent. In bivariate and random effects models in which fixed effects are not used, we also include PSID indicators of an individual's gender (male or female), race (Non-Hispanic White, Non-Hispanic Black, Hispanic, Other Non-Hispanic), and educational level (< high school, high school graduate, some college, college graduate).

5.3 Analysis

In our initial analyses, we evaluate differences in smoking prevalence, as well as demographic, employment, income and psychological measures, between those who did and did not experience at least one involuntary job loss during the analysis period. To examine our mechanism hypotheses we conduct three sets of regression models. First, we use linear regression models to assess whether a recent job loss was associated with lower family income, or higher levels of psychological distress, and whether these effects appear modified by current employment status. We then evaluate smoking as a function of job loss and employment experience using linear probability models, both with and without income and distress measures. If hypothesized mediators explain relationships between involuntary job loss and smoking, we expect job loss to significantly predict the mediator in the first analyses, and smoking in the reduced form model, and for impacts on smoking to be reduced or eliminated when the potential mediator is added to the model (Baron & Kenny, 1986). Conclusions about indirect effects of key variables through mediators require additional analyses using tools such as two-part of structural equation models (Preacher, Rucker, & Hayes, 2007); we explored these if total and direct effects from regression models differed substantively.

Multivariate regression models help isolate the effect of involuntary job loss by controlling for observed variables, but important unobserved factors may remain. We therefore employ individual participant fixed effects in each of our regression models, which control for time-invariant unobserved individual characteristics by assessing change within individuals over

time. Before choosing the fixed effects linear probability model, we considered random effects models which assume that there is no correlation between independent variables and the error terms, and conditional logit models of binary outcomes with fixed effects. The results of a Hausman test comparing the random and fixed effects models found that the estimates differed significantly (X^2=535.7, p=0.00), suggesting the larger coefficients observed in the random effects model could be biased. Results from linear probability and logit models were similar, but logistic regression models with fixed effects drop participants who do not change smoking status, so we opted for the linear probability model to maintain the same sample throughout analyses. The final econometric specification is:

$$S_{it} = a_0 + \text{Emp}_{it}\,\beta_1 + X_{it}\,\beta_2 + Y_t\,\beta_3 + \mu_i a_1 + \varepsilon_{it}$$

where S_{it} is the probability of being a smoker for individual i at time t; Emp_{it} represents the dichotomous indicator of job loss or the categorical variable measuring employment experience; X_{it} is a vector of other covariates; Y_t is a vector of observation year indicators; μ_i is a vector of time-invariant, unobserved individual characteristics; and ε_{it} is an error term.

To examine whether observed effects are distinct to a particular combination of job loss experience and employment status we conduct Wald tests comparing the different coefficients derived from the fixed effects models. To ensure that our results are not masking gender effects, we examine models stratified by gender to explore any major differences. All analyses were conducted using STATA 13 (Statacorp, College Station, Tex), and were estimated with robust standard errors adjusted for individual-level clustering. This study was supported in part by grant number R24 HD050924, and was approved by the UNC Institutional Review Board as part of study number 12-0576.

6. Results

Although smoking prevalence decreased in the PSID sample between 2001 and 2011, individuals who had experienced a recent involuntary job loss consistently smoked at higher rates than their peers who had not experienced a recent loss (Figure 1). Smoking prevalence among people without a recent job loss steadily fell from 22% in 2001 to 18% in 2011. During the same period, smoking prevalence among individuals who recently lost work rose from 35.8% in 2001 to 37.1% in 2003, then fell to 30.2% in 2011.

6.1 Differences in people by job loss experience

In bivariate analyses, people who experienced an involuntary job loss at some point during the observation window differed significantly from their never-displaced peers in several key ways (Table 1). First, displaced workers were more likely to smoke, either continuously (20% vs. 12%) or periodically (21% vs. 15%). Almost 60% of ever-displaced workers were consistent non-smokers, compared to nearly three quarters (73%) of never-displaced workers.

Second, statistical tests indicate that involuntary job loss was associated with most demographic characteristics and resource levels in the PSID sample. Ever-displaced workers

were significantly more likely to be male, Black, Hispanic, and less well-educated than people who reported no involuntary job losses. People who lost work were also more likely to experience unemployment (48% vs. 10%), be younger (40 vs. 43), have no partner in the house (25% vs. 18%), have lower average family incomes ($70,000 vs. $100,000), and be more psychologically distressed (average score of 3.7 vs. 2.7) than their non-displaced peers.

6.2 Employment experience, family income and emotional distress

We first explore whether job loss or employment experience significantly predicts increases in smoking risk factors. Regression models indicate that losing work involuntarily was not significantly associated with changes in income (Table 2, Model 1a). Compared to continuous working, however, unemployment resulted in income declines of 1% (following a recent job loss) and 6% (without recent job loss) (Table 2, Model 1b). Leaving the labor force was also associated with income decline, though this effect was only significant among those who did not involuntarily lose work. Tests of differences among the job loss/employment categories indicate that within the context of either unemployment or labor market departure, a recent job loss is associated with a significantly smaller loss of income ($F_{unemp}=73.23$, $p=0.00$; $F_{lmd}=35.71$, $p=0.00$).

Involuntary job loss was also associated with a 0.29 point increase on the psychological distress score (Table 2, Model 2a). But people who are working within two years of their loss fare no worse than if they worked continuously (Model 2b). Looking for work or being out of the labor force was associated with distress scores that were elevated by 0.6-0.8 points, regardless of job loss experience.

In sensitivity tests using the indicator of any job loss, rather than involuntary, job loss followed by labor market departure or unemployment is associated with a 1.6% (p=0.00) and 12% (p=0.00) income decline, respectively, and job loss followed by employment is associated with a 0.11 point increase in psychological distress (p<0.05). In gender stratified analyses, the income effect during unemployment following a job loss is only significant for men ($b_{female}=-0.009$ $p=0.11$; $b_{male}=-0.011$, $p=0.04$); likewise the distress effect when someone leaves the labor force following a job loss is only significant for men ($b_{male}=1.16$ $p=0.00$; $b_{female}=0.44$, $p=0.12$).

6.3 Reduced form models of job loss and smoking

In our initial fixed effects models, we find involuntary job loss experienced within the past two years is associated with a 1.1 percentage point increase in the probability of reporting smoking among the full analytic sample (Table 3, Model 1), and a 1.5 percentage point increase in smoking probability among the restricted sample of individuals (results not shown). Next, we consider job loss experience in light of current employment status in models that employ the six job loss history-employment status categories. Only two of these result in a significantly different probability of smoking when compared to people who are working and experienced no recent involuntary job loss. Being out of the labor force without a recent job loss decreases the probably of smoking by 1.9 percentage points, whereas working in the context of a recent job loss is associated with a 1.4 percentage point increase

in the likelihood of smoking (Table 3, Model 2). People who were unemployed, regardless of recent job loss experience, were no more or less likely to smoke, compared to the referent group, and Wald tests confirm that the coefficient on the two unemployed categories did not differ significantly.

Employing a definition of job loss that includes voluntary departure results in similar findings, except that labor market departure following a job loss also results in lower smoking probabilities (b= −0.017, p=0.00). Gender models indicate that the decreased smoking probabilities following labor market department in the absence of a job loss are only significant for women, though coefficient values are similar to those in the non-stratified models.

6.4 Associations of smoking with family income, psychological distress and recent job loss

Our final sets of models add family income, psychological distress, or both, to the reduced form model of employment experience. The addition of income (Table 2, Model 3), psychological distress (Table 3, Model 4), or both (Table 3, Model 5) results in no differences in employment experience coefficients. The use of the any job loss categorization in the place of the involuntary one produces the same significant decrease in smoking probability regardless of whether income or psychological distress variables are included (results not shown).

These models further indicate that changes in family income have no significant impact on smoking status when other factors are controlled, but that psychological distress does exert a significant independent impact on smoking. Specifically, a one point increase on the psychological distress scale was associated with a 0.2 percentage point increase in smoking probability, holding job loss experience, employment status and other factors constant. Stratified models indicate this effect differs by gender. When women's psychological distress levels increase by one point, it is associated with a 0.3 percentage point increase in smoking likelihood (p=0.00), but distress is not significantly associated with smoking for men (b=0.001, p=0.64).

7. Conclusions

Our study suggests that the high levels of involuntary job loss associated with the Great Recession and its aftermath might be hampering progress toward U.S. smoking goals Individuals who experienced an involuntary job loss had a 1.1 percentage point increase in their probability of smoking, on average. Returning to work did not alleviate this effect; in fact the effect was strongest among those who were working within two years of losing work. The BLS estimates that 6.9 million people lost work involuntarily between 2007 and 2009 in the U.S., and another 6.1 million were displaced between 2009-2011 (2012a). Taken together, this suggests that 165,000 people may have initiated or resumed smoking due to job loss in this four year window alone.

A recent study of smoking rates before and after the recent recession estimates that the economic crisis altogether resulted in 0.6 million more smokers in the U.S. than would have

been predicted based on previous trends and demographic shifts alone (Gallus, Ghislandi, Muttarak, & Bosetti, 2013). Our results are consistent with this finding, and suggest that involuntary job loss may be a key part of why this occurred.

To best target prevention dollars in poor economies, it may be important to understand why involuntary job loss influences smoking status. Unfortunately, our results do not provide clear support for either of the hypothesized mechanisms. Although being unemployed and out of the labor force were both associated with decreases in family income, family income was not associated with smoking. One possibility is that individuals who lose income cut back on their smoking, but do not quit altogether. Furthermore, we found that employment-related income effects were stronger *outside* of the context of job loss. Because we were trying to capture immediate shocks of job loss on smoking, our job loss measure reflects displacement in the two years prior to survey. Individuals who lost work less recently, however, may experience greater income declines, especially if any short-term benefits they might receive immediately following job loss, like unemployment insurance, have expired. Future work that examines relationships between different types of income and smoking, changes in smoking following longer term shifts in household income, and associations of income with total cigarette consumption would be a useful addition to our findings.

Although involuntary job loss was initially a significant predictor of psychological distress, further investigation indicates these effects are driven by current employment status, not the job loss experience itself. These findings are not necessarily contradictory to other research and theories which suggest that losing work is a stress-inducing event (Catalano et al., 2011; Paul & Moser, 2009). It is possible that involuntary displacement produces an immediate hike in distress levels that tapers over time, and may not be captured two years later, especially if new employment is found. In addition, the distress measure we used captures general levels of anxiety, worry and other emotions. More specific measures of work-related or financial distress could illuminate relationships that remain obscured here.

Limitations in our data prevented us from assessing some alternative mechanisms that might connect job loss and smoking behaviors, and therefore deserve attention in future research. Our analyses are U.S.-based, and may be dependent on the American context, including its national policy responses to the Great Recession. Many workplaces have implemented smokefree policies or provide employees with access to smoking cessation programs (Shopland, Gerlach, Burns, Hartman, & Gibson, 2001). Job loss and non-employment could result in the loss of smoking prevention resources, or less time spent in smoking restrictive environments. Additionally, smoking requires time in a setting where smoking is permitted. Long work hours have been tied to higher smoking relapse rates, and fewer successful quit attempts (Angrave, Charlwood, & Wooden, 2014). Information about the smoking-related policies and programs of former employers, as well as detailed time-use information, however, was not available in the PSID data. Finally, nearly half (45%) of the job losses experienced in our analytic sample occurred in the two years prior to the 2009 and 2011 survey waves; more data from periods following the Great Recession are needed to ensure that the effects we observed were not specific to this time period.

Although we were not able to elucidate clear pathways connecting job loss and smoking behavior, our study provides several important contributions to the field of employment and health. First, we showed that involuntary job loss can promote smoking. Our analysis adds to previous research by estimating within-person changes in all variables over time, thus alleviating some concerns about reverse causation, and controlling for some unmeasured characteristics of individuals that might otherwise confound associations. In bivariate comparisons of people who did and did not experienced any involuntary job loss during the analysis window, we found that these two groups differed substantially on nearly every demographic, employment, financial and emotional indicator we examined. It seems likely, therefore, that the groups differed in other ways, such as risk-taking proclivity or frequency of break-taking, which could be associated with higher propensities to both lose work and smoke. By reducing some sources of selection bias from unmeasured characteristics using the fixed effects approach, we can have confidence that the significant relationship between involuntary job loss and smoking that we find could be causal. Furthermore, our data suggest that involuntary job loss is particularly likely among individuals already at risk for poor health outcomes from other social factors. Job loss experience may be another characteristic of a "vulnerable" population that would benefit from targeted intervention efforts (Frohlich & Potvin, 2008).

Second, we showed that the effects of job loss on smoking vary by current employment status, providing insight into potential differences between employment status and displacement experience. Contrary to some, but not all, previous research, we find no impact of being unemployed on smoking status, regardless of recent job loss exposure. A smaller proportion of the sample experienced variation in unemployment (19%) than experienced job loss (27%), so it is possible that our data did not have the power to uncover a smoking-unemployment relationship. Alternatively, it may be that the job loss shock is meaningfully distinct from the status of searching for work. Some previous studies use unemployment status as a proxy or alternative measure for job loss (Jusot et al., 2008). If these concepts differ in consequential ways, failing to distinguish them could conflate results, and possibly obscure an opportunity to efficiently target smoking prevention resources immediately following displacement.

Third, our results suggest that changes in smoking among those who have lost their job in the past two years cannot be attributed to changes income or psychological distress. Job loss is only associated with smoking among those who regain employment within the first two years. However, this group experiences no significant change in psychological distress and small declines in income. Thus, other potential mechanisms must be examined in future research.

Fourth, our results underscore the importance of distinguishing individuals who are not working, but remain in the labor market, and those who have left the labor market altogether. Although we find no differences in smoking when people are working or looking for work, we do find that when people exit the labor market outside the context of a recent job loss, they are less likely to smoke. Few previous smoking studies compare individuals in and out of the labor force; two that have found positive associations between being out of the labor force and smoking. One of these examined odds of cessation among smokers, so

may not incorporate smoking uptake that could occur during labor market entry (Weden et al., 2006). The other study is cross-sectional, and does not examine changes within individuals (Prochaska et al., 2013). If working conditions, long hours and little job autonomy trigger smoking coping responses, departure from employment may alleviate these pressures, especially if the employee chose to leave and was not trying to return to work.

Our findings highlight the potential of several programs or policies that could help reduce smoking. Layoff and discharge rates in the U.S. have recently returned to pre-recession levels, but they remain a risk for many people. In January 2014, 2.8 million workers were involuntarily displaced (BLS, 2014). Smoking prevention efforts may therefore be particularly critical in places where economic growth remains slow. Since the impact of job loss is particularly strong among people who have returned to work, it may be important to provide prevention and cessation outreach to all displaced workers, even if they have been re-employed.

A recent study found that displaced workers are not well served by general community-or healthcare-based smoking cessation efforts (Neumann, Rasmussen, Ghith, Heitmann, & Tønnesen, 2013). Smoking prevention initiatives designed specifically for displaced workers could be integrated with unemployment services, and perhaps be more successful. Workplace smoking prevention and cessation programs and policies are considered effective tobacco control strategies (Cahill & Lancaster, 2014). Workplace-based opportunities that target new workers, especially those who previously experienced displacement, could augment other smoking prevention initiatives. Finally, although not implicated as a mediator, higher levels of psychological distress were directly associated with higher smoking probabilities in our study, especially among women. This finding is consistent with other studies (Dube et al., 2009; Lawrence, Mitrou, & Zubrick, 2011), underscoring the relevance of recent recommendations to pair mental health treatment with smoking prevention or cessation assistance (Prochaska, 2011).

Acknowledgments

References

Agaku IT, King BA, Dube SR. Current cigarette smoking among adults-United States, 2005-2012. MMWR. 2012; 63(02):29–34. [PubMed: 24430098]

Allegretto S, Lynch D. The Composition of the Unemployed and the Longterm Unemployed in Tough Labor Markets. Monthly Labor Review. 2010; 133(10):3–18.

Angrave D, Charlwood A, Wooden M. Working time and cigarette smoking: Evidence from Australia and the United Kingdom. Social Science & Medicine. 2014; 112:72–79. doi: 10.1016/j.socscimed. 2014.04.031. [PubMed: 24814228]

Arcaya M, Glymour MM, Christakis NA, Kawachi I, Subramanian S. Individual and spousal unemployment as predictors of smoking and drinking behavior. Social Science & Medicine. 2014; 110:89–95. doi: 10.1016/j.socscimed.2014.03.034. [PubMed: 24727666]

Baron RM, Kenny DA. The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. Journal of personality and social psychology. 1986; 51(6):1173–1182. [PubMed: 3806354]

Bentolila S, Cahuc P, Dolado JJ, Le Barbanchon T. Two-tier labour markets in the Great Recession: France versus Spain. The economic journal. 2012; 122(562):F155–F187.

Böckerman P, Ilmakunnas P. Unemployment and self - assessed health: Evidence from panel data. Health economics. 2009; 18(2):161–179. doi: 10.1002/hec.1361. [PubMed: 18536002]

Brand JE, Burgard SA. Job displacement and social participation over the lifecourse: Findings for a cohort of joiners. Social forces. 2008; 87(1):211–242.

Bureau of Labor Statistics. Job openings and labor turnover survey highlights, January 2014. 2014. Retrieved July 28, 2014, from http://www.bls.gov/jlt/jlt_labstatgraphs_january2014.pdf

Cahill K, Lancaster T. Workplace interventions for smoking cessation. The Cochrane Review. 2014; (2)

Catalano R, Goldman-Mellor S, Saxton K, Margerison-Zilko C, Subbaraman M, LeWinn K, Anderson E. The health effects of economic decline. Annual review of public health. 2011; 32:431–450. doi: 10.1146/annurev-publhealth-031210-101146.

Clougherty JE, Souza K, Cullen MR. Work and its role in shaping the social gradient in health. Annals of the New York Academy of Sciences. 2010; 1186(1):102–124. doi: 10.1111/j. 1749-6632.2009.05338.x. [PubMed: 20201870]

Clumeck N, Kempenaers C, Godin I, Dramaix M, Kornitzer M, Linkowski P, Kittel F. Working conditions predict incidence of long-term spells of sick leave due to depression: results from the Belstress I prospective study. Journal of epidemiology and community health. 2009; 63(4):286– 292. doi: 10.1136/jech.2008.079384. [PubMed: 19126562]

Croghan IT, Bronars C, Patten CA, Schroeder DR, Nirelli LM, Thomas JL, Lane K. Is smoking related to body image satisfaction, stress, and self-esteem in young adults? American journal of health behavior. 2006; 30(3):322–333. [PubMed: 16712446]

De Vogli R, Santinello M. Unemployment and smoking: does psychosocial stress matter? Tobacco control. 2005; 14(6):389–395. [PubMed: 16319362]

Dooley D, Fielding J, Levi L. Health and unemployment. Annual review of public health. 1996; 17(1): 449–465.

Dube SR, Caraballo RS, Dhingra SS, Pearson WS, McClave AK, Strine TW, Mokdad AH. The relationship between smoking status and serious psychological distress: findings from the 2007 Behavioral Risk Factor Surveillance System. International Journal of Public Health. 2009; 54(1): 68–74. doi: 10.1007/s00038-009-0009-y. [PubMed: 19396580]

Escoto KH, French SA, Harnack LJ, Toomey TL, Hannan PJ, Mitchell NR. Work hours, weight status, and weight-related behaviors: a study of metro transit workers. International Journal of Behavioral Nutrition and Physical Activity. 2010; 7:91. doi: 10.1186/1479-5868-7-91. [PubMed: 21172014]

Falba T, Teng HM, Sindelar JL, Gallo WT. The effect of involuntary job loss on smoking intensity and relapse. Addiction. 2005; 100(9):1330–1339. [PubMed: 16128722]

Frohlich KL, Potvin L. Transcending the known in public health practice: the inequality paradox: the population approach and vulnerable populations. American Journal of Public Health. 2008; 98(2): 216–221. doi: 10.2105/AJPH.2007.114777. [PubMed: 18172133]

Gallet CA, List JA. Cigarette demand: a meta - analysis of elasticities. Health economics. 2003; 12(10):821–835. [PubMed: 14508867]

Gallus S, Ghislandi S, Muttarak R, Bosetti C. Effects of the economic crisis on smoking prevalence and number of smokers in the USA. Tobacco control. 2013; 24(1):82–8. doi: 10.1136/ tobaccocontrol-2012-050856. [PubMed: 23956058]

Gilpin EA, Pierce JP, Cavin SW, Berry CC, Evans NJ, Johnson M, Bal DG. Estimates of population smoking prevalence: self-vs proxy reports of smoking status. American journal of public health. 1994; 84(10):1576–1579. [PubMed: 7943473]

Gruber J, Koszegi B. Is addiction "rational"? Theory and evidence. NBER Working Paper No. 7507. 2000

Jin RL, Shah CP, Svoboda TJ. The impact of unemployment on health: a review of the evidence. CMAJ: Canadian Medical Association journal. 1995; 153(5):529–540.

Jung Y, Oh J, Huh S, Kawachi I. The effects of employment conditions on smoking status and smoking intensity: the analysis of Korean Labor & Income Panel 8th–10th wave. PloS one. 2013; 8(2):e57109. doi: 10.1371/journal.pone.0057109. [PubMed: 23437324]

Jusot F, Khlat M, Rochereau T, Serme C. Job loss from poor health, smoking and obesity: a national prospective survey in France. Journal of epidemiology and community health. 2008; 62(4):332–337. doi: 10.1136/jech.2007.060772. [PubMed: 18339826]

Juster R-P, McEwen BS, Lupien SJ. Allostatic load biomarkers of chronic stress and impact on health and cognition. Neuroscience & Biobehavioral Reviews. 2010; 35(1):2–16. doi: 10.1016/j.neubiorev.2009.10.002. [PubMed: 19822172]

Kessler RC, Andrews G, Colpe LJ, Hiripi E, Mroczek DK, Normand S-L, Zaslavsky AM. Short screening scales to monitor population prevalences and trends in non-specific psychological distress. Psychological medicine. 2002; 32(06):959–976. [PubMed: 12214795]

Lawrence D, Mitrou F, Zubrick SR. Non-specific psychological distress, smoking status and smoking cessation: United States National Health Interview Survey 2005. BMC Public Health. 2011; 11(1):256. doi: 10.1186/1471-2458-11-256. [PubMed: 21513510]

Leigh JP. Smoking, self-selection and absenteeism. The Quarterly Review of Economics and Finance. 1996; 35(4):365–386.

Lundborg P. Does smoking increase sick leave? Evidence using register data on Swedish workers. Tobacco control. 2007; 16(2):114–118. [PubMed: 17400949]

Malarcher A, Dube S, Shaw L, Babb S, Kaufmann R. Quitting smoking among adults--United States, 2001-2010. MMWR. 2011; 60(44):1513–1519. [PubMed: 22071589]

Morduch J. Income smoothing and consumption smoothing. The journal of economic perspectives. 1995:103–114.

Neumann T, Rasmussen M, Ghith N, Heitmann BL, Tønnesen H. The Gold Standard Programme: smoking cessation interventions for disadvantaged smokers are effective in a real-life setting. Tobacco control. 2013; 22(6):e9–e9. doi: 10.1136/tobaccocontrol-2011-050194. [PubMed: 22705716]

Panel Study of Income Dynamics. Public use datasest. 2014.

Patrick DL, Cheadle A, Thompson DC, Diehr P, Koepsell T, Kinne S. The validity of self-reported smoking: a review and meta-analysis. American journal of public health. 1994; 84(7):1086–1093. [PubMed: 8017530]

Paul KI, Moser K. Unemployment impairs mental health: Meta-analyses. Journal of Vocational behavior. 2009; 74(3):264–282. doi:10.1016/j.jvb.2009.01.001.

Preacher KJ, Rucker DD, Hayes AF. Addressing moderated mediation hypotheses: Theory, methods, and prescriptions. Multivariate behavioral research. 2007; 42(1):185–227.

Price RH, Choi JN, Vinokur AD. Links in the chain of adversity following job loss: how financial strain and loss of personal control lead to depression, impaired functioning, and poor health. Journal of occupational health psychology. 2002; 7(4):302–312. [PubMed: 12396064]

Prochaska JJ. Smoking and mental illness—breaking the link. New England Journal of Medicine. 2011; 365(3):196–198. doi: 10.1056/NEJMp1105248. [PubMed: 21774707]

Prochaska JJ, Shi Y, Rogers A. Tobacco use among the job-seeking unemployed in California. Preventive medicine. 2013; 56(5):329–332. doi: 10.1016/j.ypmed.2013.01.021. [PubMed: 23415765]

Roelfs DJ, Shor E, Davidson KW, Schwartz JE. Losing life and livelihood: a systematic review and meta-analysis of unemployment and all-cause mortality. Social Science & Medicine. 2011; 72(6):840–854. doi: 10.1016/j.socscimed.2011.01.005. [PubMed: 21330027]

Ruhm CJ. Are workers permanently scarred by job displacements? The American Economic Review. 1991:319–324.

Shaw BA, Agahi N, Krause N. Are changes in financial strain associated with changes in alcohol use and smoking among older adults? Journal of studies on alcohol and drugs. 2011; 72(6):917–925. [PubMed: 22051205]

Shopland DR, Gerlach KK, Burns DM, Hartman AM, Gibson JT. State-specific trends in smoke-free workplace policy coverage: the current population survey tobacco use supplement, 1993 to 1999. Journal of Occupational and Environmental Medicine. 2001; 43(8):680–686. [PubMed: 11515250]

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Stevens AH. Persistent effects of job displacement: The importance of multiple job losses. Journal of Labor Economics. 1997:165–188.

Stolerman IP, Jarvis M. The scientific case that nicotine is addictive. Psychopharmacology. 1995; 117(1):2–10. [PubMed: 7724697]

Theodossiou E, Hipple SF. Unemployment remains high in 2010. Monthly Labor Review. 2011; 134(3):3–22.

US Department of Health and Human Services. The health consequences of smoking: a report of the Surgeon General. Atlanta, GA: 2004.

Virtanen M, Ferrie JE, Singh-Manoux A, Shipley MJ, Stansfeld SA, Marmot MG, Kivimäki M. Long working hours and symptoms of anxiety and depression: a 5-year follow-up of the Whitehall II study. Psychological medicine. 2011; 41(12):2485–2494. doi: 10.1017/S0033291711000171. [PubMed: 21329557]

Weden MM, Astone NM, Bishai D. Racial, ethnic, and gender differences in smoking cessation associated with employment and joblessness through young adulthood in the US. Social Science & Medicine. 2006; 62(2):303–316. [PubMed: 16029919]

World Health Organization. Global health risks: mortality and burden of disease attributable to selected major risks. Geneva, Switzerland: 2009.

Highlights

- We use U.S.-based longitudinal data to examine within-individual changes in smoking following employment shifts.

- Involuntary job loss can promote smoking.

- The effects of job loss on smoking vary by current employment status.

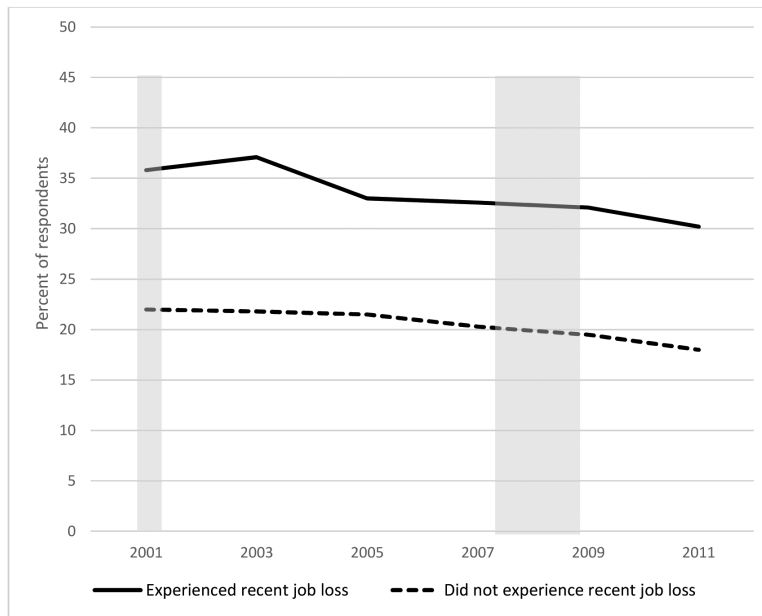- Changes in smoking from job loss cannot be attributed to changes in income or psychological distress.

Figure 1.
Smoking prevalence by recent job loss experience, 2001-2011

Table 1

Smoking, Demographic Characteristics, and Resources of Sample Participants

	Full Sample (n=13,571)		At least one job loss between 2001-2011 (n=3,408)		No job loss experience (n=10,163)	
	n	%/Mean	n	%/Mean	n	%/Mean
Smoking (2001-2011)						
Continuous non-smoker	9479	69.8%	2032	59.6%	7447	73.3% **
Continuous smoker	1919	14.1%	678	19.9%	1241	12.2% **
Periodic smoker	2173	16.0%	698	20.5%	1475	14.5% **
Employment (2001-2011)						
Employed at all observations	7620	56.1%	1172	34.4%	6448	63.4% **
Unemployed at least once	2633	19.4%	1631	47.9%	1002	9.9% **
Not in labor force at least once	4141	30.5%	1051	30.8%	3090	30.4%
Gender						
Male	6639	48.9%	1791	52.6%	4848	47.7% **
Female	6932	51.1%	1617	47.4%	5315	52.3% **
Age	13571	42.1	3408	39.6	10163	43.1 **
Partnership Status (2001-2011)						
Cohabitating at least once	10956	80.7%	2572	75.5%	8384	82.5% **
No cohabitation	2615	19.3%	836	24.5%	1779	17.5% **
Race						
White	7935	58.5%	1718	50.4%	6217	61.2% **
Black	4034	29.7%	1269	37.2%	2765	27.2% **
Hispanic	1195	8.8%	335	9.8%	860	8.5% *
Other	392	2.9%	82	2.4%	310	3.1%
Missing	15	0.1%	4	0.1%	11	0.1%
Completed education						
Less than HS	1240	9.1%	390	11.4%	850	8.4% **
HS graduate	4661	34.3%	1335	39.2%	3326	32.7% **
Some college	3617	26.7%	1001	29.4%	2616	25.7% **
College graduate	3922	28.9%	656	19.2%	3266	32.1% **
Missing	131	1.0%	26	0.8%	105	1.0%
Family income (in tens of thousands)	13,571	9.26	3408	7.06	10163	10.03 **
Psychological distress	7,769	3.24	2205	3.72	5564	2.67 **

Notes: Asterisks indicate statistically significant mean differences between sample members who did or did not experience involuntary job loss at some point during the observation timeframe. Means of time-varying variables are weighted averages across waves; wave-specific t-tests for these variables confirmed that people who experienced job loss were consistently younger, had lower family incomes and experienced higher levels of distress at all waves, compared to who did not experience job loss.

*
 $p<0.05$,

**

p<0.01

Table 2

Linear regression models of family income and psychological distress (2001-2011)

| | 1. Total family income | | | | 2. Psychological distress | | | |
| | Model 1a: Job loss | | Model 1b: Employment | | Model 2a: Job loss | | Model 2b: Employment | |
	b	CI	b	CI	b	CI	b	CI
Job Loss (JL) Experience								
No (ref)	---	--- ---	---	--- ---	---	--- ---	---	--- ---
Yes	−0.002	(−0.007 , 0.004)			0.286 **	(0.126 , 0.446)		
Total Employment Experience								
No JL: working (ref)	---	--- ---	---	--- ---	---	--- ---	---	--- ---
No JL: unemployed	---	--- ---	−0.059 **	(−0.068 , −0.050)	---	--- ---	0.809 **	(0.543 , 1.075)
No JL: out of the labor force	---	--- ---	−0.060 **	(−0.066 , −0.053)	---	--- ---	0.613 **	(0.446 , 0.780)
Any JL: working	---	--- ---	−0.016 **	(−0.023 , −0.008)	---	--- ---	0.158	(−0.047 , 0.363)
Any JL: unemployed	---	--- ---	−0.010 *	(−0.017 , −0.002)	---	--- ---	0.734 **	(0.469 , 1.000)
Any JL: out of the labor force	---	--- ---	−0.003	(−0.021 , 0.015)	---	--- ---	0.613 **	(0.153 , 1.074)
Additional Variables								
Partnership status								
Not cohabitating (ref)	---	--- ---	---	--- ---	---	--- ---	---	--- ---
Cohabitating	0.149 **	(0.142 , 0.156)	0.147 **	(0.140 , 0.153)	−0.435	(−0.486 , −0.285)	−0.432 **	(−0.582 , −0.282)
Age	0.032 **	(0.027 , 0.038)	0.030 **	(0.024 , 0.036)	0.128	(−0.019 , 0.275)	0.159 *	(0.013 , 0.306)
Age (Square)	0.000 **	(−0.001 , −0.001)	0.000 **	(−0.000 , −0.000)	0.001 *	(0.000 , 0.001)	0.000	(−0.000 , 0.001)
Respondent indicator	0.000	(−0.008 , 0.009)	−0.002	(−0.011 , 0.003)	−0.666 **	(−1.052 , −0.280)	−0.634 **	(−1.019 , −0.249)
State unemployment rate	0.001	(−0.000 , 0.003)	0.001	(−0.000 , 0.003)	−0.944	(−2.053 , 0.164)	−0.037	(−0.073 , 0.000)
Survey year indicators included?	Yes		Yes		Yes		Yes	
Fixed effects included?	Yes		Yes		Yes		Yes	
Full or restricted sample?	Full		Full		Restricted		Restricted	
Number of participants	13571		13571		7769		7769	
Number of observations	65012		65012		31274		31274	

Notes: b=beta coefficient; CI=95% confidence interval.

*
p<0.05,

**
p<0.01

Table 3

Linear probability models of smoking status

	Model 1: Job Loss		Model 2: Employment		Model 3: with income		Model 4: with distress		Model 5: with income & distress	
	b	CI	b	CI	b	CI	b	CI	b	CI
Job Loss (JL) Experience										
No (ref)	---	----	---	-----	---	-----	---	-----	---	-----
Yes	0.011 *	(0.003 , 0.020)	---	-----	---	-----	---	---	---	---
Total Employment Experience										
No JL: working (ref)	---	-----	---	-----	---	-----	---	-----	---	-----
No JL: unemployed	---	-----	0.001	(−0.012 , 0.015)	0.001	(−0.012 , 0.015)	−0.012	(−0.029 , 0.005)	−0.012	(−0.029 , 0.005)
No JL: not in labor force	---	-----	−0.019 **	(−0.027 , −0.010)	−0.019 **	(−0.027 , −0.010)	−0.021 **	(−0.033 , −0.008)	−0.021 **	(−0.033 , −0.008)
Any JL: working	---	-----	0.014 *	(−0.002 , 0.025)	0.014 *	(0.002 , 0.025)	0.019 *	(0.003 , 0.036)	0.019 *	(0.003 , 0.036)
Any JL: unemployed	---	-----	0.011	(−0.003 , 0.026)	0.011	(−0.003 , 0.026)	0.005	(−0.015 , 0.025)	0.005	(−0.015 , 0.025)
Any JL: not in labor force	---	-----	−0.015	(−0.040 , 0.011)	−0.015	(−0.040 , 0.011)	−0.010	(−0.047 , 0.027)	−0.010	(−0.047 , 0.027)
Mechanisms										
Total family income (log)	---	-----	---	-----	−0.003	(−0.016 , 0.009)	---	-----	0.001	(−0.017 , 0.019)
Psychological distress	---	-----	---	-----	---	-----	0.002 **	(0.001 , 0.003)	0.002 **	(0.001 , 0.003)
Additional variables										
Partnership status										
Not cohabitating (ref)	---	-----								
Cohabitating	−0.020 **	(−0.031 , −0.010)	−0.020 **	(−0.030 , −0.009)	−0.019 **	(−0.023 , −0.009)	−0.039 **	(−0.051 , −0.026)	−0.038 **	(−0.050 , −0.025)
Age	0.011 **	(0.003 , 0.019)	0.010 *	(0.002 , 0.018)	0.010 *	(0.002 , 0.018)	0.006	(−0.006 , 0.019)	0.007	(−0.006 , 0.019)
Age (Square)	0.000	(0.000 , 0.000)	0.000	(0.000 , 0.000)	0.000	(−0.000 , 0.000)	0.000	(−0.000 , 0.000)	0.000	(−0.000 , 0.000)
Respondent indicator	−0.002	(−0.015 , 0.011)	−0.002	(−0.015 , 0.011)	−0.002	(−0.015 , 0.011)	−0.006	(−0.040 , 0.028)	−0.006	(−0.040 , 0.028)
State unemployment rate	0.002 *	(0.000 , 0.004)	0.002 *	(0.000 , 0.004)	0.002 *	(0.000 , 0.004)	0.002	(−0.001 , 0.005)	0.002	(−0.001 , 0.005)
Survey year indicators incl.?	Yes		Yes		Yes		Yes		Yes	
Fixed effects incl.?	Yes		Yes		Yes		Yes		Yes	
Full or restricted sample	Full		Full		Full				Restricted	
Number of participants	13571		13571		13571		7769		7769	

	Model 1: Job Loss		Model 2: Employment		Model 3: with income		Model 4: with distress		Model 5: with income & distress	
	b	CI	b	CI	b	CI	b	CI	b	CI
Number of observations	64499		64499		64499		31218		31218	

Notes: b=beta coefficient; CI=95% confidence interval.

*
p<0.05,

**
p<0.01