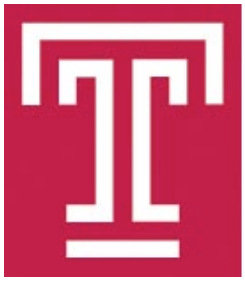

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Abstract

This study investigates the associations between self-assessed adverse labor market events (experiencing problems with coworkers, employment changes, financial strain) and health. Longitudinal data are obtained from the National Epidemiological Survey of Alcohol and Related Conditions. Our findings suggest problems with coworkers, employment changes, and financial strain are associated with a 3.1% (3.3%), 0.9% (0.6%), and 4.5% (5.1%) reduction in mental health among men (women). Associations are smaller in magnitude and less significant for physical health.

Keywords: mental health, physical health, employment, income.

JEL classification: I1; I12; J2

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1. Introduction

Economic theory and empirical evidence predict that the employed have better health than the unemployed. Several channels suggest a link between employment and health. Income is positively associated with health in standard economic theories of the demand for health (Grossman 1972) and empirical research documents that the employed have better health than the unemployed (Roelfs, Shor, Davidson and Schwartz 2011). Features of employment such as job loss and job satisfaction predict health even after conditioning on income (Sullivan and von Wachter 2009, Fischer and Sousa-Poza 2009). In other words, employment can impact health through both income and non-income channels. Given the centrality of paid work in American life, understanding and mitigating the health consequences of experiencing adversity in the labor market could lead to health improvements for a substantial segment of the population.

In this study we extend the knowledge base on employment and health by examining whether experiencing three novel and common adverse labor market events measured from the worker's perceptive are associated with mental and physical health. Our measures of adverse labor market events include self-reported problems with coworkers, employment changes, and perceived financial strain.[1] We obtain data on a sample of men and women ages 25 to 64 years from the National Epidemiological Survey of Alcohol and Related Conditions (NESARC). The longitudinal nature of our data allows us to control for time-invariant unobserved person-level heterogeneity, which could bias cross-sectional analyses. Our results indicate that experiencing problems with coworkers, employment changes, and financial strain are associated with a 3.1% (3.3%), 0.9% (0.6%), and 4.5% (5.1%) reduction in mental health among men (women). The estimated associations are smaller in magnitude and less significant for physical health. We

[1] Non-labor market events can also lead to financial strain (e.g., expensive medical treatments, declining housing market). In addition, our measure of employment change could represent a promotion or demotion in position. However, we argue in a later section that either type employment change could impose transitional problems.

provide evidence that our results are not fully attributable to reverse causality or attrition.

This study makes several contributions to the economics literature. First, we consider three important and relatively common adverse labor market events that have received little attention in the economics literature. Problems with coworkers occur frequently in modern workplaces as evidenced by the attention they receive in the popular media (e.g., television, books, magazines, blogs). Similarly, taking on new responsibilities at work or changing work hours, or jobs themselves, are typical transitions as workers progress along the employment ladder, but could lead to stress (e.g., learning new skills, establishing relationships with new colleagues, longer work hours, increased responsibility). The 2007 to 2009 recession led to substantial reductions in labor market earnings and potentially induced financial strain among many Americans. Thus, estimating associations between these common and understudied events and health is important for understanding and improving (through effective interventions) quality of life and worker productivity. Moreover, unlike much of the existing literature, our measures are subjective employment experiences and thereby compliment the research that examines more objective measures (e.g., job loss). Second, this study contributes to the literature on income and health. Although standard economic models predict that income improves health by allowing the consumer to purchase health inputs (Grossman 1972), empirical work has produced mixed results on the health-income relationship. It may be the case that income *per se* is less important for health than substantial *reductions* in income that could lead to financial instability and poor health. To address this issue, we examine a unique measure of perceived financial strain: reporting a major financial crisis, declaring bankruptcy, or multiple instances of inability to pay bills on time in the past year. Although previous economic work has included proxies for financial strain based on assets and liabilities, we are able to capture financial constraints that are

directly perceived by the individual and thus may better capture the type of financial problems that lead to health problems. Lastly, using detailed information contained in the NESARC, we are able to at least partially address important sources of bias that plague analyses of the impact of employment and income on health: omitted variables, reverse causality, and attrition.

2. Conceptual Framework and Related Work

Grossman (1972) proposed what is now a standard theoretical model to describe the demand for health. Consumers are endowed with a health stock and they value health and other goods. Individuals maximize utility given their preferences, prices, budget constraint, and health production function. Health is a stock variable that depreciates over time and consumers make investments in their health to prevent or slow depreciation. Our adverse labor market events can be viewed as arguments in the health production function. Satisfying and stable jobs can enhance health, while stressful, unpredictable, and otherwise undesirable work environments may impede health. Moreover, income allows consumers to purchase health inputs in the market place (e.g., medical services). In other words, employment can impact health through both income and non-income channels. This economic framework guides our empirical analysis.

Next, we briefly review related literature. Although many studies examine correlations between income, employment, aspects of the work environment, and health, we focus our attention here on economic studies that apply rigorous research designs (e.g., instrumental variables, person fixed effects, job loss following a plant closure or mass layoff, unexpected income receipts through lotteries and inheritances) to estimate causal effects.

Conceptually, health is a normal good (Grossman 1972), but the economics literature provides mixed empirical evidence on the direction and strength of the income-health relationship. Using an instrumental variables framework, Ettner (1996) documents that increases in income significantly improve both mental and physical health. A set of studies utilizes lottery

winnings to examine the impact of income changes on health (Apouey and Clark 2010, Gardner and Oswald 2007, Lindahl 2005). However, these studies provide mixed evidence on the direction and magnitude of the relationship. Analyses that exploit variation in income generated by the Social Security Notch or inheritances show no, or a negative, causal relationship between income and mortality (Snyder and Evans 2006, Kim and Ruhm 2012). Frijters, Haisken-DeNew and Shields (2005) examine income among East Germans following the German reunification and find a modest positive relationship between income and self-reported health. The mixed findings in the literature may be driven by differences in research designs, settings, analysis samples, or health outcomes (Kim and Ruhm 2012). Reconciling this literature is an open and important question for the economics literature, which is a fruitful topic for future research.

Other aspects of labor market success may have an independent impact on health. For example, debt obligations are linked with poor health even after conditioning on income (Zimmerman and Katon 2005). Job loss, which leads to reductions in income (Jacobson, LaLonde and Sullivan 1993) as well as time costs for health investments, is generally associated with morbidity, premature mortality, and unhealthy behaviors (Sullivan and von Wachter 2009, Strully 2009, Deb, Gallo, Ayyagari, Fletcher and Sindelar 2011). For example, Sullivan and von Wachter (2009) show that a man who is displaced from his job at age 40 lives 1 to 1.5 fewer years than an otherwise similar non-displaced man. However, analysis of job displacements using European data (Browning, Dano and Heinesen 2006) calls to question the relationships estimated with U.S. data. Moreover, workers with past unemployment spells have worse health than continuously employed workers and, in general, the unemployed are less healthy than the employed (Mullahy and Sindelar 1996, Clark, Georgellis and Sanfey 2001).

Other dimensions of the work environment such as job satisfaction, prestige, occupation,

commuting time, and hazardous work conditions also influence health after conditioning on income (Fischer and Sousa-Poza 2009, Fletcher, Sindelar and Yamaguchi 2011, Rashad Kelly, Dave, Sindelar and Gallo 2011, Rablen and Oswald 2008, Morefield, Ribar and Ruhm 2011, Lakdawalla and Philipson 2007, Roberts, Hodgson and Dolan 2011). These studies demonstrate that, independent of income, better working conditions and desirable jobs lead to better health.

Collectively, this brief review of the literature suggests that our measures of adverse labor market events will significantly impact health. Our study builds on the existing body of research by examining three measures that capture novel and common adverse labor market events, none of which have been considered in earlier studies. Moreover, because our measures represent the worker's perception of his/her labor market experience and financial status, they complement existing studies that have primarily focused on more objective measures (e.g., income, job loss).

3. Data, Variables, and Methods

3.1 The National Epidemiological Survey of Alcohol and Related Conditions (NESARC)

We analyze longitudinal data from the NESARC, a large and nationally representative survey conducted by the U.S. Bureau of the Census for the National Institute on Alcohol Abuse and Alcoholism. The survey was developed and administered to study alcohol misuse and its determinants and consequences in a large community sample of American adults (Grant, Kaplan, Shephard and Moore 2003). To this end, the NESARC collects highly detailed information on health, health behaviors, attitudes, and experiences. Wave I was fielded between August 2001 and May 2002 (N=43,093) and Wave II was fielded between August 2004 and August 2005 (N=34,653). We exclude respondents younger than 25 and older than 64 in both Waves to focus on individuals who have completed their education and have not yet transitioned into retirement (n=22,764). We next exclude respondents who report being enrolled in school at the time of the

survey (*n*=987). Finally, we exclude those who report no past year employment in either Wave (*n*=13,332). These selection rules allow us to analyze a sample that is at risk for all adverse labor market events we study. For example, a person who did not work in the past year is not at risk for problems with coworkers or employment changes. However, we may exclude individuals with the most severe events (e.g., those in long-term unemployment), so we view our results as lower bound estimates. Lastly, we drop respondents with missing control variables (these variables are detailed in a later section) (*n*=296), and who did not appear in both Waves (*n*=9,359). Our analysis sample includes 7,543 men and 7,961 women. Although any sample selection rules are to some extent arbitrary, our findings are highly robust to alternative rules.

3.2 Health Measures

We examine two measures of health: SF12-V2 mental component score (MCS) and SF12-V2 physical component score (PCS) (Ware, Kosinski, Turner Bowker and Gandek 2002). The MCS is based on 12 questions and captures mental functioning during the past 4 weeks from the individual's perspective (see Appendix Table A for included items). The MCS ranges from 0 to 100 and is normed to have a mean of 50 and a standard deviation of 10. Higher scores indicate better mental functioning. The PCS is calculated similar to the MCS and is based on the same 12 questions, except that this variable measures physical functioning. Both the MCS and PCS are commonly utilized within the health economics literature to measure health (McInerney and Mellor 2012, Davalos and French 2011, Ettner, Maclean and French 2011, Balsa, French, Maclean and Norton 2009, Gade and Wenger 2011).

3.3 Adverse Labor Market Events

We examine three past-year adverse labor market events: problems with coworkers (this variable includes problems supervisors); changes in job, job responsibilities, and/or work hours

(henceforth employment changes); and perceived financial strain. For each of the events, we code respondents as one if they affirm the event and zero otherwise. It is worth noting that these measures, particularly problems with coworkers and financial strain, are self-assessed and subject to interpretation by respondents. Thus, a fair amount of heterogeneity in these events is likely. Moreover, these variables need not necessarily map directly to objective changes in employment or income. However, we believe an individual's perception of changes in employment and financial stability is important information *per se* and it measures a dimension of labor market experience that is potentially missed by other more objective measures. Indeed, self-reported job satisfaction, an inherently subjective measure, is a standard metric studied within labor economics (Card, Mas, Moretti and Saez 2012, Clark, Kristensen and Westergård-Nielsen 2009, BÖCkerman and Ilmakunnas 2009, Kosteas 2011, Artz 2010). Moreover, inclusion of person fixed-effects in our regression models will account for time invariant heterogeneity across individuals in assessment in labor market adversity.

The employment change variable possesses a potential drawback. Employment change may represent a positive or negative labor market event. Regardless, this variable captures transitional effects, which are often stressful even if the transition leads to an improvement in employment status (e.g., psychic costs of establishing relationships, increased responsibility that may come with a promotion). Supporting this premise, Boyce and Oswald (2012) show that promotions lead to deteriorations in psychological health in a sample of British workers.

Our measure of perceived financial strain asks respondents whether they have experienced "a major financial crisis, declaring bankruptcy, or more than once unable to pay bills on time." Unlike standard proxies for financial strain in the economics literature that compare assets to liabilities (Zimmerman and Katon 2005), we are able to capture perceived financial

strain. Thus, this variable may better capture the type of financial events that are relevant for health. However, as noted above, individuals are likely heterogeneous in how they report these experiences. For example, what may be perceived as a financial crisis to one individual may be considered a minor financial problem to another.

3.4 Control Variables

Because our preferred specifications include person fixed effects, and these fixed effects subsume all time-invariant personal characteristics, we control for a parsimonious set of health predictors in our regression models. Specifically, we control for age in years, household income in 2004 dollars, an indicator for being fired or laid-off during the past year (including this variable conditions on particularly poor labor market events and further allows us to interpret the employment change variable as capturing transitional effects), marital status (divorced/separated, widowed, and never married, with married as the omitted category), an indicator for any children under age 18 in the household, an indicator for any health insurance, and Wave fixed effects. Household income in the NESARC is categorical[2] and we construct a pseudo continuous measure by assigning the mid-point value of each income category. For the top income category ($200,000 or higher), we recode household income as $300,000. Household income is plausibly influenced by the adverse labor market events we study, and thus potentially endogenous in our regression models. Including endogenous controls in regression models can lead to biased parameter estimates (Angrist and Pischke 2009). In unreported analysis, we re-estimate our models without the household income variable and results are highly consistent, however.

3.5 Empirical Model

[2] The categories include: < $5,000; $5,000 to $7,999; $8,000 to $9,999; $10,000 to $12,999; $13,000 to $14,000; $15,000 to $19,999; $20,000 to $24,999; $25,000 to $29,999; $30,000 to $34,999; $35,000 to $39,999; $40,000 to $49,999; $50,000 to $59,999; $60,000 to $69,999; $70,000 to $79,999; $80,000 to $89,999; $90,000 to $99,999; $100,000 to $109,999; $110,000 to $119,999; $120,000 to $149,999; $150,000 to $199,999; and ≥ $200,000.

We estimate person fixed effects health production functions specified in Equation (1):

(1) $$H_{it} = \beta_1' LM_{it} + \beta_2' X_{it} + W_t + \alpha_i + \varepsilon_{it}$$

By including person fixed effects, we investigate changes in, rather than the level of, health and adverse labor market events. H_{it} is health (physical or mental) for individual *i* at time *t*, LM_{it} is a vector of adverse labor market events, X_{it} is a vector of time-varying personal characteristics, W_t is the survey Wave fixed effect, α_i represents person fixed effects, and ε_{it} is a random error term. We apply NESARC sample weights in all analyses, which account for survey design, so our findings are generalizable from our NESARC sample to the U.S. population ages 25 to 64. Standard errors are clustered around the individual.[3] [4]

4. Results

4.1 Sample Characteristics

Table 1 (Table 2) reports summary statistics for men (women) at Waves I and II. The mean MCS and PCS values in the male sample are 54.38 and 54.14 in Wave I, and decline to 53.59 and 53.68 in Wave II. The analysis sample of men has above average mental and physical health compared to the full sample (recall that the MCS and PCS are normed to have a mean of 50), which is not surprising given that we study a sample of relatively young (ages 25 to 64) men with comparatively high labor market attachment.

The proportion of the sample that reports adverse labor market events is stable across the two Waves (differences are generally not statistically different). At Wave I, 10%, 24%, and 9% of the male sample reports problems with coworkers, employment changes, and perceived financial strain, and the proportions are nearly identical at Wave II. Approximately 33% of the

[3] Estimates of precision are consistent if we estimate heteroskedasticity-robust standard errors.
[4] In unreported analysis, we re-estimate all equations with random effects models and the results are consistent in sign, magnitude, and statistical significance to the reported results.

male sample reports any of the three adverse labor market events in the past year. Although time invariant and thus not included in the regression models, race/ethnicity and education are reported in Table 1 for comparison purposes.

Table 2 reports comparable summary statistics for women. At Wave I, the MCS and PCS scores are 52.37 and 53.86. By Wave II, the MCS and PCS scores decline to 51.14 and 53.22, and these differences are statistically significant ($p \leq 0.01$). At Wave I, 12%, 27%, and 11% of the female sample reports problems with coworkers, employment change, and perceived financial strain. By Wave II, these values are 11%, 25%, and 13%. Approximately 39% of the female sample reports any of the three adverse labor market events in the past year.

Because we estimate person fixed effect models, we identify parameter estimates off respondents who experience changes in health and adverse labor market events between Waves I and II. Thus, it is vital that our data contain sufficient variation in these variables to reliably estimate parameters. Table 3A reports statistics on the proportion of the sample that experience each adverse labor market outcome at Wave I and not at Wave II, Wave II and not Wave I, at both Waves, and at neither Wave. We report the unweighted sums and percentages for each of the mutually exclusive and collectively exhaustive categories. For example, 6.10% (n=460), 7.03% (n=530), 3.18% (n=240), and 83.70% (n=6,313) of men in our analysis sample report perceived financial strain at Wave I and not at Wave II, Wave II and not Wave I, at both Waves, and at neither Wave.

In Table 3B we report the average changes in the MCS and PCS across waves as well as the associated standard deviations, for men and women. The mean change in the MCS and PCS between Wave I and II for men is -0.693 and -0.465, and the associated standard deviations are 8.914 and 7.366. The magnitude of the changes in MCS and PCS from Wave I to Wave II is

similar among women.

4.1 Regression Results

Table 4 reports regression results for the associations between adverse labor market events and health. The top panel reports MCS results and the bottom panel reports PCS results. In Column (1) we report results from models that estimate Equation (1) with each adverse labor market event entered separately. That is, each cell is from a separate regression and reports the association between adverse labor market event *j* and health without controlling for the *j-1*other events. Column (2) reports results from our preferred specification that enters the adverse labor market events collectively into the health production function. The latter set of results minimizes potential bias from omitted variables.

We first consider our measure of mental health (i.e., MCS). In specifications that enter each adverse labor market event individually, problems with coworkers, employment change, and perceived financial strain are associated with a 1.91, 0.74, and 2.62 unit (3.5%, 1.4%, and 4.9%) decrease in the MCS ($p \leq 0.01$). As expected, the parameter estimates are attenuated in models that enter all three adverse labor market events collectively. Namely, problems with coworkers, employment change, and perceived financial strain are associated with a 1.67, 0.48, and 2.42 unit (3.1%, 0.9%, and 4.5%) reduction in the MCS. Among women, only problems with coworkers and financial strain significantly predict MCS in our preferred specification. Quantitatively, experiencing problems with coworkers and financial strain are associated with a 1.71 and 2.64 unit (3.3% and 5.1%) reduction in the MCS. To provide some context on the size of these associations, problems with coworkers and financial strain represent roughly three-tenths and two-fifths (one-fifth and one-third) of a standard deviation change in MCS scores among males (females). Stated differently, the magnitude of the financial strain association is

equivalent to moving from roughly the 70th percentile to the 50th percentile in both the male and female MCS distributions.

We next turn to our measure of physical health (i.e., PCS). Adverse labor market events, at measured in this study, are not as important predictors of physical health as they are for mental health. Among men, only financial strain significantly predicts the PCS and the magnitude of the association is smaller than in the MCS regressions. Specifically, experiencing this adverse labor market event is associated with a 0.78 unit (1.4%) reduction in the PCS in models that enter all three adverse labor market events collectively ($p \leq 0.05$). Among women, experiencing an employment change and perceived financial strain are associated with a 0.37 and 0.91 unit (0.7% and 1.7%) reduction in PCS in models that enter the adverse labor market events collectively (the estimates are slightly larger in magnitude when events are entered individually). The problems with coworkers variable is never a statistically significant predictor of PCS among women. Considering the practical significance of these findings, perceived financial strain represents about one-ninth (one-eighth) of a standard deviation decrease in the PCS score among males (females). These associations are equivalent to moving a respondent from the 67th and 64th percentiles of the PCS distribution to the 50th percentile among men and women respectively.

In Appendix Table B we re-estimate Equation (1) with all three adverse labor market events entered collectively and without including person fixed effects. In other words, we ignore the longitudinal feature of our data. Comparing Table 4 and Appendix Table B provides some information on the advantages of longitudinal data, which allows us to circumvent potential bias from time-invariant omitted variables. Results in Appendix Table B are consistent in sign with those reported in Table 4, but are much larger in magnitude and more precisely estimated.

5. Robustness Checks and Extensions

5.1 Reverse Causality and Non-random Attrition

We next examine how robust our results are to two important sources of potential bias that are not addressed in our person fixed effects models. Namely, reverse causality (i.e., changes in health may lead to changes in adverse labor market events) and non-random attrition. Indeed, there is a large literature showing that poor health impedes labor market success (Ettner, Maclean and French 2011, Ettner, Frank and Kessler 1997, Stewart 2001, Zarkin, French, Mroz and Bray 1998, French, Roebuck and Alexandre 2001). We explore the potential importance of reverse causality by leveraging the lifetime health information contained in the NESARC. The NESARC has detailed information on chronic physical health conditions and lifetime experiences with mental health problems. We select what we term a "baseline healthy" sample of workers at Wave I who never met the criteria for any of the chronic physical health conditions[5] nor the American Psychiatric Association (2000) Axis I mental health disorders.[6] Thus, this sample has not experienced any major health shocks by Wave I of the NESARC. Because we structurally force adverse labor market events to precede negative health shocks in this sample, reverse causality should be minimized. However, a limitation of this robustness check is that it cannot capture sub-diagnosable health problems (e.g., individuals who fall just short of the American Psychiatric Association definition of lifetime depression) and therefore is unlikely to fully address reverse causality concerns.

We re-estimate Equation (1) using the baseline healthy sample and report results from specifications that include all three adverse events collectively in Appendix Table C. Among both men and women, problems with coworkers and perceived financial strain are again

[5] Chronic physical health conditions include hardening of the arteries, high blood pressure/hypertension, cirrhosis of the liver, other liver diseases, chest pain/angina pectoris, rapid heartbeat/tachycardia, heart attack/myocardial infarction, other heart disease, stomach ulcer, gastritis, arthritis, and schizophrenia.

[6] Lifetime mental health conditions include depression, mania, dysthymia, hypomania, panic disorder, agoraphobia, social phobia, specific phobia, generalized anxiety, posttraumatic stress disorder, and attention deficit disorder.

associated with significantly worse mental health, and the magnitudes of the parameter estimates are similar to those reported in Table 4. Although the direction of the relationships between employment changes and MCS is consistent with the results reported in Table 4, the coefficients are generally smaller in magnitude and less precisely estimated.

To provide further evidence on the potential importance of reverse causality, in separate regressions we model Wave II MCS and PCS variables as a function of adverse labor market events measured at Wave I, health at Wave I (MCS in the MCS regression and PCS in the PCS regression), personal characteristics at Wave I, and time-invariant characteristics (race/ethnicity and education). Thus, we again force adverse labor market events to precede health outcomes. Results from specifications that include all three adverse events collectively are reported in Appendix Table D and are consistent with those reported in Table 4. Although neither of these robustness checks is able to completely address reverse causality concerns, together they suggest that reverse causality is unlikely to fully explain our findings.

A perennial concern with longitudinal data such as the NESARC is non-random attrition. Attrition is a concern in the NESARC data as 28.2% of male respondents and 29.0% female respondents attrited between Waves I and II.[7] Attritors may be inherently different from respondents who complete both surveys in ways that are difficult to observe, and person fixed effects models cannot address this source of bias. Nevertheless, we apply NESARC sample weights in all analyses, which are designed to at least partially address attrition patterns. In unreported analysis, we further examine non-random attrition by estimating a weighted probit model of attriting between Waves I and II as a function of Wave I health (MCS and PCS), Wave I adverse labor market events, and other covariates included in Equation (1) measured at Wave I.

[7] These numbers include both respondents who attrited between Waves and specific sub-populations not resampled by NESARC administrators in Wave II (e.g., persons living on military bases in Wave I but who returned to the general household population in Wave II).

Wave I MCS is not a statistically significant predictor of the probability of attrition, but Wave I PCS is significant ($p \leq 0.01$). However the magnitude of the PCS association is small (a one unit increase in PCS is associated with a one percent decrease in the probability of attriting among both men and women). Employment changes and perceived financial strain are not statistically significant predictors of the probability of attrition, but those who experience problems with coworkers are less likely to attrite. Several personal characteristics are significantly associated with the probability of attrition. For example, attritors are older, less likely to have health insurance, and less educated. If those who attrite are more vulnerable to adverse labor market events then we may be underestimating the true associations.

To empirically explore how non-random attrition may bias our findings, in unreported analyses we assign attritors a Wave II health value equal to their Wave I health value plus the mean gender-specific change in MCS and PCS values between Wave I and II among completers who experienced a decline in their health (average MCS decline = -0.47 for men and -0.65 for women; average PCS decline = -0.70 for men and -1.09 for women). In other words, we assume that all attritors experience an identical health decline (equal to the gender-specific sample mean decline) between Waves I and II. We then re-estimate our models separately for men and women with the attritors assigned this lower level of health in Wave II[8] under two different assumptions about attritor adverse labor market events at Wave II: 1) attritors experience no adverse labor market events at Wave II (i.e., all adverse labor market event indicators set to zero); and 2) attritors experience all five adverse labor market events at Wave II (i.e., all adverse labor market event indicators set to one). Results are highly robust for both men and women, and suggest that non-random attrition cannot fully explain our findings.

6. Discussion

[8] We exclude subjects who attrited between Waves I and II, and did not provide valid a MCS or PCS at Wave I.

This study investigates the associations between three common and understudied self-assessed adverse labor market events (problems with coworkers, employment change, and perceived financial strain) and mental and physical health in a sample of working-age Americans. We find that experiencing these events, problems with coworkers and perceived financial strain in particular, are negatively associated with health for men and women. Problems with coworkers, employment change, and financial strain are associated with an estimated 3.1% (3.3%), 0.9% (0.6%), and 4.5% (5.1%) reduction in mental health among men (women). Estimated associations are smaller in magnitude and less precise for physical health.

Our study has two important limitations that must be considered when interpreting the findings. First, although we address potential bias from unobservable time-invariant characteristics that may be correlated with adverse labor market events and health, our models do not account for time-varying unobservable attributes (e.g., lifestyle factors). Second, although we provide suggestive evidence that reverse causality and non-random attrition are not important concerns, we cannot definitively rule out these potential sources of bias. Moreover, attrition in the NESARC is non-trivial. Although there is no obvious solution to this data limitation, and it must be acknowledged when interpreting our findings.

Unlike studies that investigate common and objective changes in employment outcomes (e.g., job loss, income) our measures are subject to personal interpretation. While subjectivity probably leads to greater heterogeneity, we believe that a worker's perception of his work environment and financial status captures important domains of labor market success that cannot be studied based on objective measures alone. Indeed, our analysis of these self-assessed outcomes offers a compliment to studies that investigate more objective measures.

Employers may find our results interesting and useful, as the costs of poor employee

health are high. In 2012, the average employer cost of a family health insurance plan was $11,429 (Claxton, Rae, Panchal, Damico, Whitmore, Kenward and Osei-Anto 2012) and $327 billion in productivity is lost each year to employee health-related problems (Davis, Collins, Doty, Ho and Holmgren 2005). In response to these financial burdens, 94% of large employers (500 or more employees) that provide health insurance offered some form of wellness program to employees (Kaiser Family Foundation 2012). These programs may be cost-beneficial as a recent review suggests that every dollar spent on worksite wellness leads to $3.27 in medical cost savings and $2.73 in absenteeism cost savings (Baicker, Cutler and Song 2010). Employers may wish to expand these programs to assist employees as they transition into new job responsibilities and/or work hours, and encounter financial strain. Furthermore, employer policies that identify and mitigate employee conflicts may help to improve overall employee health.

These findings are timely as the U.S. slowly recovers from the 2007 to 2009 recession. In June, 2013 the unemployment rate was 7.6% (United States Bureau of Labor Statistics 2013). This recession was the largest economic contraction since the Great Depression (National Bureau of Economic Research 2010) and many Americans experienced reduced earnings during this period. Our findings suggest that perceived financial strain is associated with declines in both mental and physical health. If the 2007 to 2009 recession also caused conflict between employees and/or changes in job responsibilities and hours, then this recession may have indirectly led to reductions in mental and physical health. Given that recent research shows the 2007 to 2009 recession led to heightened stress and morbidity (Currie and Tekin 2011, Deaton 2012, McInerney, Mellor and Hersch 2013), our findings identify specific mechanisms through which adverse labor market events can impact health.

Table 1. Health, adverse labor market events, and personal characteristics: Men (*N*=15,086)

	Wave I	Wave II
Variable	**Mean/proportion**	**Mean/proportion**
Health		
Mental component score	54.38 (SD=7.29)	53.59 (SD=7.37)
Physical component score	54.14 (SD=6.46)	53.68 (SD=6.74)
Adverse labor market events[1]		
Problems with coworkers	0.10	0.10
Employment change[2]	0.24	0.24
Perceived financial strain	0.09	0.09
Personal characteristics		
Age	41.21 (SD=9.39)	44.28 (SD=9.37)
Household income	$71,410 (SD=$54,606)	$80,778 (SD=$60,657)
Fired or laid off	0.05	0.05
Married or living as married	0.76	0.77
Divorced/separated	0.10	0.11
Widowed	0.00	0.01
Never married	0.14	0.12
Child under age 18 in the household	0.51	0.46
Any health insurance	0.84	0.78
White	0.73	0.73
African American	0.09	0.09
Asian	0.04	0.04
Hispanic	0.12	0.12
American Indian	0.02	0.02
Less than high school	0.10	0.10
High school	0.26	0.26
Some college	0.29	0.29
College degree	0.19	0.18
Graduate school	0.16	0.17

Notes: NESARC sample weights applied. Observations with missing information, younger than 25 and older than 64 years in both Wave I and II, current enrollment in school, or did not report any work in the past year in Wave I and Wave II are excluded.

[1]Adverse labor market event variables pertain to the past year.

[2]Employment change includes changes in employment hours, roles/responsibilities, or job.

Table 2. Health, adverse labor market events, and personal characteristics: Women (*N*=15,922)

	Wave I	Wave II
Variable	**Mean/proportion**	**Mean/proportion**
Health		
Mental component score	52.37 (SD=8.25)	51.41 (SD=8.62)
Physical component score	53.86 (SD=7.37)	53.2 (SD=7.61)
Adverse labor market events[1]		
Problems with coworkers	0.12	0.11
Employment change[2]	0.27	0.25
Perceived financial strain	0.11	0.13
Personal characteristics		
Age	41.91 (SD=9.40)	44.99 (SD=9.40)
Household income	$65,521 (SD=$51,403)	$72,564 (SD=$55,282)
Fired or laid off	0.03	0.03
Married or living as married	0.69	0.69
Divorced/separated	0.16	0.17
Widowed	0.02	0.03
Never married	0.13	0.12
Child under age 18 in the household	0.50	0.43
Any health insurance	0.85	0.78
White	0.71	0.71
African American	0.13	0.13
Asian	0.04	0.04
Hispanic	0.10	0.10
American Indian	0.02	0.02
Less than high school	0.08	0.08
High school	0.25	0.24
Some college	0.34	0.35
College degree	0.17	0.17
Graduate school	0.17	0.18

Notes: NESARC sample weights applied. Observations with missing information, younger than 25 and older than 64 years in both Wave I and II, current enrollment in school, or did not report any work in the past year in Wave I and Wave II are excluded.

[2]Employment change includes changes in employment hours, roles/responsibilities, or job.

Table 3A. Adverse Labor Market Events: Change Status between Wave I and Wave II

	Event in Wave I, not in Wave II	Event in Wave II, not Wave I	Event in both Wave I and II	No Event in Wave I or II
		Men		
Problems with coworkers	520 (6.90%)	533 (7.07%)	212 (2.81%)	6,280 (83.23%)
Employment change	1,131 (15.00%)	1,168 (15.49%)	630 (8.35%)	4,614 (61.16%)
Perceived financial strain	460 (6.10%)	530 (7.03%)	240(3.17%)	6,313(83.70%)
		Women		
Problems with coworkers	685 (8.60%)	658 (8.27%)	271(3.40%)	6,347 (79.73%)
Employment change	1,389 (17.45%)	1,268 (15.93%)	819 (10.29%)	4,485 (56.34%)
Perceived financial strain	596 (7.49%)	774 (9.72%)	435 (5.46%)	6,156(77.33%)

Table 3B. Health Outcomes: Change between Wave I and Wave II

	Mean	Standard Deviation
Men		
Mental component score	-0.693	8.914
Physical component score	-0.465	7.366
Women		
Mental component score	-1.087	10.030
Physical component score	-0.653	8.068

Table 4. Selected fixed effects regression results for adverse labor market events and health

	Men (*N*=15,086)		Women (*N*=15,922)	
	(1)	(2)	(1)	(2)
	Adverse labor market events entered individually	**Adverse labor market events entered collectively**	**Adverse labor market events entered individually**	**Adverse labor market events entered collectively**
Outcome variable: Mental component score				
Sample mean	53.99 (SD=7.29)		51.89 (SD=7.37)	
Problems with coworkers	-1.906***	-1.674***	-1.969***	-1.701***
	(0.344)	(0.344)	(0.348)	(0.346)
Employment change	-0.741***	-0.490**	-0.433*	-0.103
	(0.224)	(0.230)	(0.235)	(0.241)
Perceived financial strain	-2.620***	-2.426***	-2.837***	-2.635***
	(0.399)	(0.398)	(0.378)	(0.380)
Outcome variable: Physical component score				
Sample mean	53.91 (SD=6.46)		53.54 (SD=6.74)	
Problems with coworkers	0.137	0.193	-0.011	0.118
	(0.267)	(0.266)	(0.262)	(0.266)
Employment change	-0.0239	0.0463	-0.410**	-0.386*
	(0.176)	(0.185)	(0.206)	(0.209)
Perceived financial strain	-0.743**	-0.743**	-0.941***	-0.917**
	(0.323)	(0.322)	(0.356)	(0.356)

Notes: All models estimated with fixed effects linear regression, and are weighted with the NESARC survey weights and control for age, household income, fired or laid-off, marital status (divorced/separated, widowed, and never married, with married or living as married as the omitted category), an indicator for a child under age 18 in the household, an indicator for any health insurance, and survey Wave fixed effects. Standard errors are reported in parentheses and clustered at the individual level.

***; **; and * = $p \leq 0.01$; $p \leq 0.05$; and $p \leq 0.10$.

Appendix Table A. SF12 survey questions

Number	Question wording
1	In general, would you say your health is ....
	The following items are activities you might do during a typical day. Does your health limit you in these activities?
2	.....Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling or playing golf?
3	.....Climbing several flights of stairs?
	During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of your physical health?
4	..... Accomplished less than you would like?
5	.... Were limited in the kind of work or other activities?
	During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)? (Please answer YES or NO for each question.)
6	.... Accomplished less than you would like?
7	.... Didn't do work or other activities as carefully as usual?
8	During the past 4 weeks, how much did pain interfere with your normal work (including both work outside of the home and housework)?
	The next questions are about how you feel and how things have been with you during the past 4 weeks. for each question, please give the one answer that comes closest to the way you have been feeling. How often during the past 4 weeks....
9	.... Have you felt calm and peaceful?
10	.... Did you have a lot of energy?
11	.... Have you felt down-hearted and blue?
12	During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting with friends, relatives, etc.)?

Appendix Table B: Selected regression results for adverse labor market events and health: No person fixed effects

	Men (*N*=15,086)	**Women (*N*=15,922)**
Outcome: Mental component score		
Sample mean	53.91 (SD=6.46)	51.89 (SD=7.37)
Problems with coworkers	-3.610***	-3.707***
	(0.274)	(0.297)
Employment change	-1.042***	-0.809***
	(0.175)	(0.194)
Financial strain	-3.730***	-4.692***
	(0.359)	(0.321)
Outcome: Physical component score		
Sample mean	53.91 (SD=6.46)	53.54 (SD=6.74)
Problems with coworkers	-0.991***	-0.465*
	(0.263)	(0.263)
Employment change	-0.368**	-0.423**
	(0.166)	(0.184)
Financial strain	-1.891***	-2.653***
	(0.303)	(0.324)

Notes: All models estimated with linear regression, and are weighted with the NESARC survey weights and control for control for age, household income, fired or laid-off, marital status (divorced/separated, widowed, and never married, with married or living as married as the omitted category), an indicator for a child under age 18 in the household, an indicator for any health insurance, and survey Wave fixed effects. Standard errors are reported in parentheses and clustered at the individual level.
***; **; and * = $p \leq 0.01$; $p \leq 0.05$; and $p \leq 0.10$.

Appendix Table C: Selected fixed effects regression results for adverse labor market events and health: Baseline healthy sample

	Men (*N*=10,015)	**Women (*N*=8,652)**
Outcome: Mental component score		
Sample mean	54.35 (SD=7.09)	52.28 (SD=8.18)
Problems with coworkers	-1.700***	-1.799***
	(0.511)	(0.550)
Employment change	-0.111	-0.454
	(0.292)	(0.337)
Financial strain	-1.978***	-2.655***
	(0.509)	(0.550)
Outcome: Physical component score		
Sample mean	54.92 (SD=5.61)	54.75 (SD=6.28)
Problems with coworkers	0.544	1.078***
	(0.405)	(0.387)
Employment change	0.230	-0.610**
	(0.219)	(0.275)
Financial strain	-0.958**	0.155
	(0.442)	(0.545)

Notes: Baseline healthy sample includes respondents who do not report any chronic conditions or meet American Psychiatric Association (2000) Axis I clinical conditions. All models estimated with fixed effects linear regression, and are weighted with the NESARC survey weights and control for age, household income, fired or laid-off, marital status (divorced/separated, widowed, and never married, with married or living as married as the omitted category), an indicator for a child under age 18 in the household, an indicator for any health insurance, and survey Wave fixed effects. Standard errors are reported in parentheses and clustered at the individual level. ***; **; and * = $p \leq 0.01$; $p \leq 0.05$; and $p \leq 0.10$.

Appendix Table D: Selected fixed effects regression results for adverse labor market events and health: Modeling Wave II health outcomes as a function of Wave I adverse labor market events

	Men (*N*=7,545)	**Women (*N*=7,961)**
Outcome: Mental component score		
Sample mean	53.56 (SD=7.53)	51.25 (SD=8.80)
Problems with coworkers	-1.533***	-1.564***
	(0.360)	(0.386)
Employment change	-0.0215	0.132
	(0.248)	(0.265)
Financial strain	-1.200***	-1.712***
	(0.381)	(0.442)
Outcome: Physical component score		
Sample mean	53.70 (SD=6.66)	53.02 (SD=7.67)
Problems with coworkers	-0.847***	-0.750**
	(0.299)	(0.298)
Employment change	-0.368*	-0.0898
	(0.220)	(0.229)
Financial strain	-0.530	-0.482
	(0.357)	(0.387)

Notes: All models estimated with fixed effects linear regression, and are weighted with the NESARC survey weights and control for health outcomes (either MCS for the MCS regression and PCS for the PCS regression) measured at Wave II; age, household income, fired or laid-off, marital status (divorced/separated, widowed, and never married, with married or living as married as the omitted category), an indicator for a child under age 18 in the household, an indicator for any health insurance, race/ethnicity indicators (African American, Asian, American Indian, and Hispanic with white race as the omitted category), education indicators (high school, some college, college graduate, and post-graduate with less than high school as the omitted category) measured at Wave I; and survey wave fixed effects. Standard errors are reported in parentheses and clustered at the individual level. ***; **; and * = $p \leq 0.01$; $p \leq 0.05$; and $p \leq 0.10$.

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