Published in final edited form as:
J Occup Environ Med. 2013 September ; 55(9): 1007–1014. doi:10.1097/JOM.0b013e3182a299af.

Working conditions and depressive symptoms: A prospective study of U.S. Adults

Sarah A. Burgard, PhD,
Departments of Sociology and Epidemiology, University of Michigan, Ann Arbor, Michigan, US

Michael R. Elliott, PhD,
Survey Research Center, Institute for Social Research, Department of Biostatistics, University of Michigan, Ann Arbor, Michigan, US

Kara Zivin, PhD, and
Department of Psychiatry, University of Michigan, Ann Arbor, Michigan, US

James S. House, PhD
Survey Research Center, Institute for Social Research, Ford School of Public Policy, University of Michigan, Ann Arbor, Michigan, US

Abstract

Objective—Prior longitudinal studies of negative working conditions and depression generally have used a single exposure indicator, such as job strain, and have required consistent availability of the measure across waves and selection of only those working at all measurement points.

Methods—Up to four waves of the American's Changing Lives study (1986-2001/2) and item response theory (IRT) models were used to generate wave-specific measures of negative working conditions. Random-intercept linear mixed models assessed the association between the score and depressive symptoms.

Results—Adjusting for covariates, negative working conditions were associated with significantly greater depressive symptoms.

Conclusion—A summary score of negative working conditions allowed use of all available working conditions measures and predicted depressive symptoms in a nationally-representative sample of U.S. workers followed for up to 15 years. Linear mixed models also allowed retention of intermittent workers.

INTRODUCTION

Stressful working conditions are linked to poorer mental health [1]. However, many prior studies have used two standardized exposure models, drawing on either the job strain model that considers the intersection of perceived job demands and control over working conditions (with additional components of job insecurity and workplace social support sometimes measured) [2], or on the effort-reward imbalance model that considers inconsistencies between levels of effort and rewards of the job [3]. Although measures based on these models have predicted health outcomes in numerous populations, they may not capture the full range of negative conditions individuals experience on the job, and some researchers have suggested considering a wider array of work characteristics [4]. The few studies that have considered multiple aspects of work (e.g., job strain, effort-reward

Corresponding Author: Sarah A. Burgard, PhD, Mailing address: Department of Sociology, University of Michigan, 500 South State Street, Ann Arbor, Michigan 48109-1382, burgards@umich.edu, Phone: 734.615.9538.

imbalance, and work-to-family conflict in the same analysis) have shown that each contributes to mental health net of others [e.g., 5], suggesting that studies focusing on a particular model or aspect of work may have underestimated exposure to stressful conditions at work.

Most studies using job strain as a focal exposure use a 12-item short form, or fewer items from the Job Content Questionnaire (JCQ), a 49 question instrument that captures detailed aspects of demands and control at work, job insecurity, physical exertion, and social support in the workplace [6]. Implementing long instruments or multiple scales to capture disparate aspects of work has been prohibitively costly for many surveys, except those primarily focused on psychosocial exposures at work. Consequently, highly-detailed longitudinal data on working conditions have not been consistently collected, particularly in cohort studies in the United States, though prospective data can provide the most convincing evidence for links between workplace experiences and health changes.

Some prior studies, most of European workers, have assessed how changes in working conditions are linked to changes in health [e.g., 7, 8, 9], but even careful studies like these usually rely on only two exposure measurement points. However, a recent study using three exposure measurement points found that workers exposed more often or consistently to stressful conditions had worse mental health, controlling for earlier characteristics and baseline mental health [10]. In addition to being somewhat constrained by the number of exposure measurement points, most prior studies of changes in working conditions and changes in health have used modeling strategies that can include only individuals who were working at all exposure measurement points, leading to analytic samples that do not capture workers entering and leaving the workforce. For example, in a rare study with four measurement points, 44% of workers were not analyzed because their employment transitions were too complex to be captured in a categorical measure of trajectories of job demands and control [11]. Past studies incorporating multi-wave information about working conditions have thus faced important challenges.

To complement extant evidence for health consequences based on assessments of stability and change in a few specific models or aspect of working conditions, we propose a new modeling strategy. To capture levels and changes in a broad range of exposures associated with employment, we use item-response theory (IRT) models to generate continuous working conditions scores that summarize an individual's work experience at a given survey wave relative to the rest of the working population, based on all available working conditions measures at that wave. We create these measures for four waves of the American's Changing Lives Study (ACL), a nationally-representative cohort of U.S. residents. We then use random-intercept linear mixed models to assess how negative working conditions are associated with depressive symptoms, using all possible observations from all respondents working in at least one wave. Our focus on U.S. workers is also an important contribution because prior evidence is based largely on workers from nations with stronger social safety nets and worker protections.

DATA AND METHODS

Data

The ACL study began in 1986 with a sample of U.S. adults aged ≥25, with African Americans and people aged ≥60 over-sampled at twice the rate of the others. Baseline face-to-face interviews were conducted with 3,617 men and women (representing 70% of sampled households and 68% of sampled individuals); these individuals were contacted for follow-up in subsequent waves of data collection in 1989 (83% of survivors), 1994 (83% of survivors), and 2001/2002 (76–80% of survivors). At each wave, respondents reported on

their current health and the employed reported on working conditions. Further information about the ACL can be found elsewhere [12]. The analytic sample included respondents 25-64 years old at baseline (N = 2,842) who were working at least twenty hours a week in at least one wave (N = 1,921) and not missing on any control variables used (N = 1,889).

Measures

Depressive symptoms were measured using the Center for Epidemiological Studies Depression Scale (CES-D) [13]. An 11-item subset of the complete scale was collected, which has been shown to represent the full CES-D [14]. Responses to each item about how respondents felt in the past week were scored on a three-item Likert-type scale (1 = hardly ever, 2 = some of the time, 3 = most of the time). We generated scores using seven of these items ("I felt depressed," "Everything was an effort," "My sleep was restless," "I felt lonely," "I didn't feel like eating," "I felt sad," "I couldn't get going"), focusing on depressive affect and somatic symptoms because these are most commonly found in symptom-screening scales for depression [15], and have been successfully used in prior work with the ACL data as a score of averaged items [16]. We averaged across the seven items to obtain a wave-specific depressive symptoms score (range: 1-3; calculated for those reporting at least four items; only 6 or fewer respondents were missing on the score in any wave because of this restriction). In results not shown, we found that the substantive pattern of results was similar when using a score that averaged across all 11 items, and when using alternative specifications that summed across the 11 items and used an exploratory cut point value [17].[1]

We utilized all relevant working conditions measures available at a given survey wave to construct a negative working conditions score. These included component items of the job strain model whenever they were available, and many other items. Table 1 shows each item and response categories, coded such that a score of 1 indicates the most negative condition and a score of 0 indicates a less negative or positive condition, and the percentage reporting the negative condition. In wave 1, for example, 18 items were available, and about 17% of respondents who were working at least 20 hours per week enjoyed their work only a little, some, or not at all. Different sets of working conditions items were available in different waves (17 at waves 2 and 4, 6 at wave 3).

IRT models were fit to estimate a single, summary wave-specific working conditions score [18], and Table 2 presents the results of these models. We used HLM 6.0 software to estimate two-level, hierarchical logistic regression models in which the level-1 units were survey item responses about working conditions and the level-2 units were respondents. The level one model at survey wave *t* is:

[1]To explore the sensitivity of our results to the specification of the CES-D score that used a continuous measure of the average across items, we created exploratory dichotomous measures using all 11 items at each wave. We recoded the values of the response categories for each item by subtracting 1, to arrive at the typical 0-2 range, and then created two exploratory dichotomized indicators using a cut point. For the first exploratory measure, we dichotomized each item, separating those reporting "hardly ever" (=0) from those reporting "sometimes" or "most of the time" (=1), then summed across items (possible range 0 – 11). Respondents whose summed value across the 11 items was 6 or greater were recoded as 1 (high depressive symptoms) and those whose value was less than 6 were recoded as 0 (lower depressive symptoms). This cut point value was obtained from exploratory work by Gellis [17]. For the second exploratory measure, we simply summed across all items (possible range: 0 – 22); respondents whose summed value across the 11 items was 6 or greater were recoded as 1 (high depressive symptoms) and those whose value was less than 6 were recoded as 0 (lower depressive symptoms). When using these two exploratory measures of high depressive symptoms and linear regression models that mirror those presented in the main results, our substantive conclusions about the association between negative working conditions and depressive symptoms were very similar to those presented. Though these exploratory outcome measures were dichotomous, we were unable to estimate nonlinear regression models with the appropriate sampling weights, leading us to favor and present the results based on linear scores comprised of averages across items.

$$\mathrm{P}(\mathrm{Y}_{\mathrm{tij}}=1)=[\exp(\pi_{\mathrm{ti}}+\sum_{\mathrm{j}=1}^{\mathrm{J1}}\phi_{\mathrm{tj}}\mathrm{X}_{\mathrm{tij}})]/[1+\exp(\pi_{\mathrm{ti}}+\sum_{\mathrm{j}=1}^{\mathrm{J1}}\phi_{\mathrm{tj}}\mathrm{X}_{\mathrm{tij}})] \quad (1)$$

where Y_{tij} is the dichotomous response to item j=1,…,J for respondent i =1,…,n, π_{ti} is the respondent-specific propensity to experience negative working conditions, and X_{tij} takes on a value of 1 if response for person i is to item j in the negative working conditions scale and 0 otherwise. Only J - 1 such indicator variables are included in the model, with the reference item value set to zero for identifiability purposes, so ϕ_{tj} represents the difference in log-odds of a positive response between item j and the reference item, conditional on the respondent-specific propensity for poor working conditions π_{ti}. Level 2 (across respondents) is modeled as

$$\pi_{ti}=\beta_{00}+\beta_q W_{ti}+u_{0ti},\ \ u_{0ti}\sim N(0,\tau_{t00}) \quad (2)$$

$$\phi_{tj}=\beta_{tj0},\ \ j=1,\ldots,J-1 \quad (3)$$

where τ_{t00} represents the variance of the subject-level propensity for poor working conditions across the population at wave t, and W_{ti} indicates whether the respondent reported a serious health shock in the past three years, which could have affected their experience or reports of working conditions and mental health. Item effects ϕ_{tj} are constrained to be invariant across respondents at each wave.

To obtain the wave-specific working conditions score, we added the empirical Bayes residual $\hat{u}_{0ti}$ to the grand mean value β_{00}. Empirical Bayes residuals take into account differences in the reliability of measurement of ϕ_{it} due to missing survey items at level one [19]. The negative working conditions score for each wave was standardized for comparability across waves, and values range from −2.48 to 3.50. We also created a wave-specific categorical measure of the score based on the quartiles of the distribution for that wave.

In multivariable analyses, we used wave-specific (time-varying) measures of the respondent's age category (25-39, 40-54, and 55-64), a wave indicator, denoted as the average number of years since baseline (0, 3, 8, 15), an indicator of the number of chronic conditions reported by the respondent (arthritis, lung disease, hypertension, heart attack, diabetes, cancer, foot problems, stroke, broken bones, urine beyond control; range 0-8), number of hours worked (part-time = <35 hours per week, full-time = 35-44 hours per week, overtime = 45+ hours per week), and broad occupational category based on U.S. census occupations (professional/managerial, clerical/sales/service, and craft/operator/transport/laborer). We also used time-constant measures of characteristics from baseline, including sex (male versus female), race (African American versus other), educational attainment (<high school, high school, some college, bachelor's degree or more), household income category (imputed midpoints of income categories in 1986 dollars, ranging from $2,500 to $110,000, expressed in thousands of dollars), and respondent's neuroticism score (standardized scale using five dichotomous items, including: "Would you call yourself a nervous person," "Would you call yourself tense or 'high-strung';" Range: -1.2 to 2.2).

Statistical Analysis

We examined descriptive statistics separately by wave, using wave-specific weights that make ACL respondents representative of the noninstitutionalized adult population in the contiguous United States in 1986, adjusting for attrition. For multivariable analysis we reshaped the data to obtain up to four person-wave observations per respondent, one for each

wave at which the respondent was working at least 20 hours per week. This yielded 4,779 person-wave observations for the 1,889 respondents, with an average of 2.5 observations available per respondent. We estimated associations between time-varying depression scores and working condition scores using random-intercept linear mixed models [20]. We accommodated case weights in the construction of point estimates and standard errors in the linear mixed models, with the baseline sample weight used at level 2 (person level), and the wave-specific weights divided by the baseline weights at level 1 (person-wave level) [21].

RESULTS

Table 3 presents descriptive information for the analytic sample by survey wave, using weighted means and standard deviations or percentages. In wave 1, ACL respondents working at least 20 hours per week had an average CES-D score of 1.42 and reported about 0.6 chronic conditions. About half were under 40, two in five were working in a professional/managerial position, and only 15% were working part-time. Over subsequent waves, wave-specific samples were similar to the wave 1 analytic sample or showed reasonable changes for a cohort aging 15 years.

Table 4 presents results from random-intercept linear mixed models of depressive symptoms. Model 1 includes only the time-varying negative working conditions score, Model 2 adds all time-constant and time-varying predictors, and Model 3 presents a categorical specification of the negative working conditions score to assess the possibility of a nonlinear association. Results for Model 1 show that for each one unit (standard deviation) increase in the standardized negative working conditions score, CES-D scores rise by about 0.07 units. Adjusting for time-varying and time-constant covariates in Model 2 reduces the coefficient to 0.05, but it remains statistically significant. Results for Model 3 show that the difference between the lowest and each higher quartile of the negative working conditions score is statistically significant and the coefficients increase, with a coefficient of 0.13 for the highest quartile relative to the lowest.

To provide additional perspective on the magnitude of this association, in parallel models for which we standardized the CES-D score (not shown), the coefficient for the negative working conditions measure was equal to 0.17 in Model 1, or close to one-fifth of a standard deviation in the CES-D score. The coefficient for the highest quartile of negative working conditions was 0.31 for Model 3 in these alternative models, representing about one-third of a standard deviation in the CES-D score, a substantial difference. To assess the robustness of these results, we also estimated fixed effects regression models that assessed wave-to-wave change in depression associated with change in negative working conditions, controlling for all stable, unmeasured characteristics of these respondents (not shown). These models showed a substantively similar pattern of results. We chose not to present these as the small number of observations per subject will tend to downwardly bias effect estimates; use of random effects models avoids this problem.

DISCUSSION

We created a novel negative working conditions score, providing a strategy to exploit potential indictors of working conditions other than those found in a few commonly-used models of psychosocial stress in the workplace. Our measurement strategy can capture a wider range of experiences that workers face on the job, while not requiring the same set of items to be fielded in each wave of a survey. This negative working conditions score was positively associated with U.S. workers' depressive symptoms net of their age, race, education, occupational group, work hours, family income, chronic health conditions and neuroticism. Using up to four observations per respondent, random-intercept models

allowed us to more efficiently capture the association between negative working conditions exposure and depressive symptoms. Additionally, they allow us to include respondents working at any wave, rather than dropping those not working at every wave at which a specific working condition was measured, as has been conventional in prior studies.

Though this study provides a novel approach and used high quality data to provide new evidence representing U.S. workers, limitations should be considered. We used self-reports of exposures and outcome, and unmeasured factors such as a negative reporting style or an underlying mental health condition could shape the association between self-reported working conditions and health. We used a wide array of subjective and more objective working condition items and addressed underlying individual-level characteristics with adjustment for neuroticism and supplementary fixed effects models (discussed above), but studies using mental health diagnoses or objectively measured levels or changes in working conditions could test the robustness of our findings.

Using our created score precluded observing how any particular working condition was associated with depressive symptoms. However, our approach has at least two advantages relative to focusing on one or more specific measures. First, reducing a wide array of working conditions to a single score reduces problems that arise when many correlated predictors are included together in regression models. Second, there is little theoretical guidance to suggest how potentially harmful work characteristics will cluster for workers, so empirical strategies that make use of the underlying covariance structure of the data avoid arbitrary and post-hoc classifications. Moreover, some have argued that specific measures like job strain may better represent the workplace experiences for those in blue collar production jobs [4] than of other workers. The growing proportion of workers in the white collar and service sectors may have increased the salience of other stressful aspects of work, suggesting the value of a broad and inclusive measurement strategy [22].

Our results showed that negative working conditions were associated with significantly higher depressive symptoms in a nationally-representative sample of U.S. workers interviewed up to four times over about 15 years. These findings add to the growing body of evidence that employment is an important source of divergence in mental health across midlife, and suggest the need to consider the role of good jobs in enhancing worker productivity and reducing the costs of depression for workers, their families, and healthcare systems.

Acknowledgments

NICHD funding (1 R03 HD057268-01A2) supported the time of SAB and MRE to conduct analysis and write manuscript; NIA funding (PO1 AG0551, RO1 AG018418) supported original collection of the ACL data, though publicly-available data were used for these analyses. NICHD and NIA were not involved in the study design, collection, analysis or interpretation of data or in the writing of this paper or decision to submit it for publication.

SOURCES

1. Stansfeld S, Candy B. Psychosocial work environment and mental health - a meta-analytic review. Scandinavian Journal of Work, Environment & Health. 2006; 32(6):443–462.
2. Karasek R, et al. The Job Content Questionnaire (JCQ): an instrument for internationally comparative assessments of psychosocial job characteristics. Journal of Occupational Health Psychology. 1998; 3(4):322–355. [PubMed: 9805280]
3. Siegrist J, et al. The measurement of effort-reward imbalance at work: European comparisons. Social Science & Medicine. 2004; 58:1483–1499. [PubMed: 14759692]
4. Netterstrøm B, et al. The Relation between Work-related Psychosocial Factors and the Development of Depression. Epidemiologic Reviews. 2008; 30(1):118–132. [PubMed: 18587142]

5. Wang J, et al. A Population-based Longitudinal Study on Work Environmental Factors and the Risk of Major Depressive Disorder. American Journal of Epidemiology. 2012; 176(1):52–59. [PubMed: 22556191]
6. Wang JL. Perceived work stress, imbalance between work and family/personal lives, and mental disorders. Social Psychiatry and Psychiatric Epidemiology. 2006; 41(7):541–548. [PubMed: 16572273]
7. Strazdins L, et al. Could better jobs improve mental health? A prospective study of change in work conditions and mental health in mid-aged adults. Journal of Epidemiology and Community Health. 2011; 65(6):529–534. [PubMed: 20515897]
8. Godin I, et al. A prospective study of cumulative job stress in relation to mental health. BMC Public Health. 2005; 5(67)
9. Wang J, et al. Changes in Perceived Job Strain and the Risk of Major Depression: Results From a Population-based Longitudinal Study. American Journal of Epidemiology. 2009; 169(9):1085–1091. [PubMed: 19318611]
10. Stansfeld SA, et al. Repeated Job Strain and the Risk of Depression: Longitudinal Analyses From the Whitehall II Study. American Journal of Public Health. 2012; 102(12):2360–2366. [PubMed: 23078508]
11. de Lange A, et al. Effects of stable and changing demand–control histories on worker health. Scandinavian Journal of Work, Environment & Health. 2002; 28(2):94–108.
12. House JS, Lantz PM, Herd P. Continuity and Change in the Social Stratification of Aging and Health Over the Life Course: Evidence from a Nationally Representative Longitudinal Study from 1986 to 2001/2 (The Americans' Changing Lives Study). Journal of Gerontology: Series B. 2005; 60 B(Special Issue 2):15–26.
13. Radloff LS. The CES-D Scale: A Self-Report Depression Scale for Research in the General Population. Applied Psychological Measurement. 1977; 1:385–401.
14. Kohout F, et al. Two Shorter Forms of the CES-D (Center for Epidemiological Studies Depression) Depression Symptoms Index. Journal of Aging and Health. 1993; 5(2):179–193. [PubMed: 10125443]
15. Kessler RC, et al. The relationship between age and depressive symptoms in two national surveys. Psychology and Aging. 1992; 7(1):119–126. [PubMed: 1558696]
16. Clarke P, et al. The Social Structuring of Mental Health over the Adult Life Course: Advancing Theory in the Sociology of Aging. Social Forces. 2011; 89(4):1287–1313.
17. Gellis ZD. Assessment of a Brief CES-D Measure for Depression in Homebound Medically Ill Older Adults. Journal of Gerontological Social Work. 2010; 53(4):289–303. [PubMed: 20461617]
18. DeMars, C. Item Response Theory. New York: Oxford University Press; 2010.
19. Bryk, AS.; Raudenbush, SW. Hierarchical Linear Models: Applications and Data Analysis Methods. Newbury Park, CA: Sage; 1992.
20. Verbeke, G.; Molenberghs, G. Linear Mixed Models for Longitudinal Data. New York: Springer; 2000.
21. Pfeffermann D, et al. Weighting for Unequal Selection Probabilities in Multilevel Models. Journal of the Royal Statistical Society, Series B. 1998; 60:23–40.
22. Jencks C, Perman L, Rainwater L. What Is a Good Job? A New Measure of Labor-Market Success. American Journal of Sociology. 1988; 93(6):1322–1357.

Table 1

Percent reporting each working condition by wave, ACL respondents working at least 20 hours per week in at least one wave.

Question	Coding	Wave 1	Wave 2	Wave 3	Wave 4
How much do you enjoy doing that work?	0 = great deal/quite a bit; 1 = not at all/ some/a little	16.6%	18.2%	18.8%	16.7%
How satisfied are you with your job?	0 = very/completely; 1 = not at all/ not very/somewhat	31.0%	35.3%	36.5%	30.3%
In general, how often do you feel bothered or upset in your work?	0 = never/rarely/sometimes; 1 = almost always/often	10.5%	11.7%	9.6%	11.1%
Do you supervise others on your job?	0 = yes; 1 = no	49.9%	50.0%	51.9%	50.7%
Works <=35 hours/wk, would like to have worked more past year	0 = no; 1 = yes	5.2%	4.7%	4.8%	--
How likely during next couple of years that you will lose main job?	0 = not at all/not too likely; 1 = somewhat/very likely	18.0%	16.5%	--	--
If lost job, what would be chances of finding another job that paid about the same?	0 = very good/good; 1 = fair/poor	32.9%	35.1%	--	--
I have very little chance to decide how I do my work	0 = strongly/somewhat disagree; 1 = strongly/somewhat agree	25.7%	20.6%	--	10.7%
I get to do a variety of different things in my work	0 = strongly/somewhat agree; 1 = strongly/somewhat disagree	8.8%	8.5%	--	9.5%
I have a lot of say about what happens in my work	0 = strongly/somewhat agree; 1 = strongly/somewhat disagree	19.7%	20.6%	--	--
My work requires working very fast	0 = strongly/somewhat disagree; 1 = strongly/somewhat agree	67.2%	61.1%	--	--
My work requires lots of physical effort	0 = strongly/somewhat disagree; 1 = strongly/somewhat agree	51.7%	43.8%	--	--
I have enough time to get my work done	0 = strongly/somewhat agree; 1 = strongly/somewhat disagree	23.1%	26.1%	--	26.8%
My work requires rapid and continuous physical activity	0 = strongly/somewhat disagree; 1 = strongly/somewhat agree	43.8%	36.0%	--	--
I am free from conflicting demands that others make	0 = strongly/somewhat agree; 1 = strongly/somewhat disagree	51.0%	51.1%	--	47.5%
I am bored with my work	0 = strongly/somewhat disagree; 1 = strongly/somewhat agree	19.8%	N/A	--	--
I am not appreciated for the work I do	0 = strongly/somewhat disagree; 1 = strongly/somewhat agree	29.7%	N/A	--	--
In the past 3 years, had serious problems or difficulties in work that upset you a lot	0 = no; 1 = yes	31.6%	23.5%	--	--
When at work, bothered by things at home or concerning my family that I should be doing	0 = rarely/never; 1 = sometimes/often/all the time	--	34.5%	--	--
Ever worked in unsafe working conditions/ exposed to things like radiation, hazardous chemicals or waste, or polluted air, water, soil	0 = no; 1 = yes	--	--	31.2%	n/a
My job requires me to be creative	0 = strongly/somewhat agree; 1 = strongly/somewhat disagree	--	--	--	16.8%
I am not asked to do an excessive amount of work	0 = strongly/somewhat agree; 1 = strongly/somewhat disagree	--	--	--	44.5%
My job leaves me feeling too tired and stressed after work to participate in activities with friends and family that I'd like to	0 = no; 1 = yes	--	--	--	31.8%
How noisy would you say your work environment is?	0 = not at all/a little; 1 = somewhat/very	--	--	--	36.6%
How physically demanding is your work?	0 = not at all/a little; 1 = somewhat/very	--	--	--	47.3%
In your job, how often do you inhale dust?	0 = rarely/never; 1 = sometimes/often	--	--	--	37.3%
How often do you smell strong fumes or odors when you're working?	0 = rarely/never; 1 = sometimes/often	--	--	--	32.3%

Question	Coding	Wave 1	Wave 2	Wave 3	Wave 4
How often do you perform dangerous work?	0 = rarely/never; 1 = sometimes/often	--	--	--	20.8%
How often do you work with or near toxic substances or hazardous wastes?	0 = rarely/never; 1 = sometimes/often	--	--	--	18.5%
N		1,686	1,331	1,109	792

Figures based on all respondents working at least 20 hours in a given wave. Percentages weighted, N unweighted.

Table 2

Coefficients, standard errors, and p-values from IRT models generating negative working conditions score, by wave, ACL respondents working at least 20 hours per week in at least one wave.

	Wave 1			Wave 2			Wave 3			Wave 4		
	Coeff.	**SE**	**p**	**Coeff.**	**SE**	**p**	**Coeff.**	**SE**	**p**	**Coeff.**	**SE**	**p**
How much do you enjoy doing that work?	-2.13	(0.078)	<.001	-1.80	(0.087)	<.001	-1.55	(0.089)	<.001	-1.70	(0.112)	<.001
How satisfied are you with your job?	-1.38	(0.072)	<.001	-1.00	(0.078)	<.001	-0.69	(0.082)	<.001	-0.90	(0.101)	<.001
In general, how often do you feel bothered or upset in your work?	-2.79	(0.089)	<.001	-2.47	(0.097)	<.001	-2.42	(0.115)	<.001	-2.30	(0.135)	<.001
Do you supervise others on your job?	-0.49	(0.074)	<.001	-0.29	(0.083)	0.001	omitted/intercept			omitted/intercept		
Works <=35 hours/wk, would like to have worked more past year	-3.45	(0.112)	<.001	-3.22	(0.128)	<.001	-2.98	(0.127)	<.001		--	
How likely during next couple of years that you will lose main job?	-2.07	(0.081)	<.001	-1.94	(0.091)	<.001		--			--	
If lost job, what would be chances of finding another job that paid about the same?	-1.27	(0.074)	<.001	-0.98	(0.082)	<.001		--			--	
I have very little chance to decide how I do my work	-1.62	(0.073)	<.001	-1.53	(0.083)	<.001		--		-2.22	(0.117)	<.001
I get to do a variety of different things in my work	-2.81	(0.096)	<.001	-2.44	(0.104)	<.001		--		-2.31	(0.121)	<.001
I have a lot of say about what happens in my work	-1.94	(0.078)	<.001	-1.67	(0.088)	<.001		--			--	
My work requires working very fast	omitted/intercept			omitted/intercept				--			--	
My work requires lots of physical effort	-0.52	(0.066)	<.001	-0.52	(0.069)	<.001		--			--	
I have enough time to get my work done	-2.04	(0.076)	<.001	-1.60	(0.080)	<.001		--		-1.11	(0.113)	<.001
My work requires rapid and continuous physical activity	-0.81	(0.063)	<.001	-0.86	(0.068)	<.001		--				
I am free from conflicting demands that others make	-0.72	(0.069)	<.001	-0.50	(0.077)	<.001		--		-0.28	(0.108)	0.009
I am bored with my work	-1.99	(0.077)	<.001		--			--			--	
I am not appreciated for the work I do	-1.47	(0.072)	<.001		--			--			--	
In the past 3 years, had serious problems or difficulties in work that upset you a lot	-1.55	(0.072)	<.001	-1.69	(0.083)	<.001		--			--	
When at work, bothered by things at home or concerning my family upset you a lot		--		-1.11	(0.080)	<.001		--			--	
Ever worked in unsafe working conditions or exposed to things like radiation, hazardous chemicals or waste, or polluted air, water, soil		--			--		-1.04	(0.089)	<.001		--	
My job requires me to be creative		--			--			--		-1.61	(0.099)	<.001
I am not asked to do an excessive amount of work		--			--			--		-0.35	(0.106)	0.001
My job leaves me feeling too tired and stressed after work to participate in activities with friends and family that I'd like to		--			--			--		-0.83	(0.108)	<.001
How noisy would you say your work environment is?		--			--			--		-0.57	(0.101)	<.001
How physically demanding is your work?		--			--			--		-0.17	(0.103)	0.11

	Wave 1			Wave 2			Wave 3			Wave 4		
	Coeff.	**SE**	**p**	**Coeff.**	**SE**	**p**	**Coeff.**	**SE**	**p**	**Coeff.**	**SE**	**p**
In your job, how often do you inhale dust?		--			--			--		-0.58	(0.100)	<.001
How often do you smell strong fumes or odors when you're working?		--			--			--		-0.82	(0.105)	<.001
How often do you perform dangerous work?		--			--			--		-1.44	(0.117)	<.001
How often do you work with or near toxic substances or hazardous wastes?		--			--			--		-1.63	(0.118)	<.001
Intercept	-0.95	(0.022)	<.001	-1.00	(0.023)	<.001	-1.29	(0.038)	<.001	-1.02	(0.035)	<.001
N		1,686			1,331			1,109			792	

Note: Figures based on all respondents working at least 20 hours in a given wave. All IRT models adjust for health shock (in past three years or since last wave) at level 2 (respondent level). All wave-specific working conditions entered simultaneously into one wave-specific model.

Table 3

Description of Respondent Characteristics by Wave, ACL respondents working at least 20 hours per week in a given wave.

	Wave 1: 1986	Wave 2: 1989	Wave 3: 1994	Wave 4: 2001/2
Time-Varying Measures: Wave-specific CES-D score	1.42 (0.38)	1.37 (0.36)	1.31 (0.35)	1.31 (0.34)
Negative Working Conditions Score (standardized within wave)	-0.05 (0.97)	-0.02 (0.99)	-0.02 (1.00)	0.00 (1.01)
Age group				
24-39	50.2%	44.5%	26.3%	0.0%
40-54	35.0%	40.5%	55.4%	66.7%
55-64	14.7%	13.9%	16.7%	31.0%
Number of Chronic Conditions (out of 8)	0.63 (0.91)	0.64 (0.97)	0.76 (0.94)	0.84 (0.99)
Occupational Category				
Professional/Managerial	39.4%	40.4%	41.8%	43.4%
Clerical/Sales/Service	32.4%	34.2%	34.1%	32.6%
Craft/Operative/Laborer	28.3%	25.4%	24.2%	24.0%
Work Hours				
Overtime (45+ hours/week)	40.1%	43.0%	44.8%	42.9%
Full time (35-44 hours/week)	45.3%	42.4%	38.9%	41.3%
Part time (<35 hours/week)	14.7%	14.7%	16.3%	15.8%
Time-Constant Measures: 1986 values				
Male	57.9%	56.1%	53.5%	53.0%
African American race	11.1%	10.4%	9.6%	9.2%
Educational Attainment				
Less than High School	14.0%	12.3%	11.4%	9.5%
High School	34.3%	33.6%	33.3%	32.4%
Some College	26.0%	27.2%	27.8%	29.3%
Bachelor’s Degree or More	25.7%	26.8%	27.6%	28.9%
R and Spouse income (thousands of dollars)	36.74 (23.92)	36.16 (23.60)	36.13 (23.80)	35.51 (23.27)
Neuroticism score	-0.08 (0.96)	-0.08 (0.94)	-0.06 (0.94)	-0.03 (0.97)
N (person-wave observations)	1,644	1,278	1,068	789

Percentages weighted, N unweighted.

Table 4

Coefficients and standard errors from random-intercept linear mixed models of depressive symtoms, ACL respondents working 20 hours per week in at least one wave.

	Model 1	Model 2	Model 3
Negative Working Conditions Score	0.069 *** (0.007)	0.050 *** (0.007)	--
Negative Working Conditions Score Quartiles (Lowest quartile omitted)			
Second quartile	--	--	0.033 * (0.014)
Third quartile	--	--	0.052 *** (0.015)
Highest quartile	--	--	0.131 *** (0.018)
Age group (40-54 omitted)			
24-39	--	0.046 *** (0.014)	0.048 *** (0.014)
55-64	--	-0.026 (0.014)	-0.025 (0.014)
Number of Chronic Conditions	--	0.030 *** (0.006)	0.031 *** (0.006)
Occupational Category (Professional/managerial omitted)			
Clerical/Sales/Service	--	0.030 (0.016)	0.032 * (0.016)
Craft/Operative/Laborer	--	0.016 (0.019)	0.018 (0.019)
Employment status (Full time omitted)			
Part time (<35 hours/week)	--	-0.035 * (0.016)	-0.034 * (0.016)
Overtime (45+ hours/week)	--	-0.004 (0.013)	-0.003 (0.013)
Years since baseline (survey wave indicator)			
3 years (wave 2)	--	-0.045 *** (0.012)	-0.042 ** (0.013)
7 years (wave 3)	--	-0.101 *** (0.013)	-0.097 *** (0.013)
15 years (wave 4)	--	-0.090 *** (0.016)	-0.086 *** (0.016)
Male	--	-0.055 *** (0.015)	-0.054 *** (0.015)
African American race	--	0.072 *** (0.016)	0.072 *** (0.016)
Educational attainment (High School omitted)			
Less than High School	--	0.028 (0.023)	0.028 (0.023)
Some College	--	-0.034 (0.019)	-0.032 (0.019)
Bachelor's Degree or More	--	-0.018 (0.020)	-0.017 (0.020)
Respondent and Spouse income (thousands of 1986 dollars)	--	-0.001 * (0.000)	-0.001 * (0.000)
Neuroticism score	--	0.128 *** (0.009)	0.129 *** (0.009)
Constant	1.374 *** (0.008)	1.446 *** (0.024)	1.382 *** (0.027)
Wald Chi-squre	87.6 ***	804.5 ***	786.2 ***

N = 4,779 for all models.

* p<.05,

** p<.01,

*** p<.001