Psychological Well-Being During the Great Recession: Changes in Mental Health Care Utilization in an Occupational Cohort

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A vast literature documents a robust relationship between unemployment and a variety of mental health disorders.[1,2] Although studies show that mental health deteriorates because of job loss,[3,4] which increases during recessions, less evidence exists on the impacts of recession on the mental health of remaining workers. However, the impacts of recessions on mental health may extend beyond the direct effect of unemployment.[5,6] Increased job insecurity,[6-9] feelings of powerlessness,[10] increased workload, and changes in job scope—as well as anger or sympathy for laid-off coworkers—may affect mental health.

It is difficult to study the mental health of workers during recessions because measuring changes in mental health requires sensitive measures and panel data. We previously examined changes in new diagnoses of depression for an employed population during the recent recession and found no significant association, but this may be attributable to the high specificity of our measure, which might not have been sensitive enough to capture subtle changes in how workers feel.[11] Although self-reported symptoms or depression scales are thought to be sensitive to small changes in mental health, surveys with these measures tend to be cross-sectional and therefore cannot account for workers' previous mental health.[1] If remaining workers are selected on mental health, then cross-sectional estimates may underestimate the true effect of recessions on the mental health of remaining workers, similar to the well-known healthy worker bias.[12] To estimate changes in mental health, panel data are necessary to take into account workers' previous mental health.

As an alternative to self-reported depression scales, we exploited detailed claims data for a panel of continuously employed, continuously insured workers during 2007 to 2010 to examine changes in use of mental health services and medications during the recent recession. We explored the yearly number of mental health inpatient and outpatient visits before and during the recession, as well as the yearly supply of prescriptions filled for opiates, antidepressants, sleep aids, and anxiolytics. We examined these 4 drug classes because previous research suggests that job stress is related to the onset of generalized anxiety disorder and depression[13] and that sleep disorders and drug abuse are often precursors to depression.[14] In addition, we examined opiates because stress is known to relate to a wide variety of psychosomatic illnesses, including chronic pain.[15,16]

We focused on discontinuous changes in the trend for these 4 medication classes because evidence shows an increasing trend in their use across developed countries.[17] We found descriptive evidence of selection into our panel on both physical and mental health, making the remaining continuously employed and insured cohort healthier. We used piecewise regression, a method used to compare trends in an outcome variable before and after a defined discontinuity, to examine changes in trends after 2009. We accounted for individual-level unobservable time-invariant characteristics (e.g., gender, race, underlying health) with fixed-effects regressions. We also accounted for area-level changes in the unemployment rate. We explored the extent to which heightened job insecurity, caused by local plant layoffs, may have led to an increase in mental health services and treatments. We also examined the medium-term patterns in the mental health outcomes for the subset of workers who remained employed and insured through 2012, to investigate whether any of the observed changes in mental health–related utilization were long lasting or dissipated with the improvement in the economy in 2011 to 2012.

METHODS

We selected workers for our sample from linked administrative personnel and claims data sets from a multisite US manufacturing firm. These data are described elsewhere.[8,11,18] We focused on 2 cohorts: a panel of 11 625 employees who were continuously employed at the 25 largest plants, in 15 states, from

Objectives. We examined the mental health effects of the Great Recession of 2008 to 2009 on workers who remained continuously employed and insured.

Methods. We examined utilization trends for mental health services and medications during 2007 to 2012 among a panel of workers in the 25 largest plants, located in 15 states, of a US manufacturing firm. We used piecewise regression to compare trends from 2007 to 2010 in service and medication use before and after 2009, the year of mass layoffs at the firm and the peak of the recession. Our models accounted for changes in county-level unemployment rates and individual-level fixed effects.

Results. Mental health inpatient and outpatient visits and the yearly supply of mental health–related medications increased among all workers after 2009. The magnitude of the increase in medication usage was higher for workers at plants with more layoffs.

Conclusions. The negative effects of the recession on mental health extend to employed individuals, a group considered at lower risk of psychological distress. (*Am J Public Health.* 2015;105:304–310. doi:10.2105/AJPH.2014.302219)

January 2007 to December 2010, in which we examined short-term changes in outcomes, and a panel of 10 242 employees who were continuously employed at the same 25 plants from January 2007 to December 2012, in which we examined medium-term changes. All employees in the sample had insurance coverage throughout the study period, ensuring access to mental health services. The firm provided health insurance benefits with identical provider networks to employees and families through a local preferred provider organization, subject to choice in family coverage and deductible rates. Limited changes in preferred provider coverage, copays, and deductibles occurred during the study period.

We used claims data to quantify utilization of mental health services and medications. These data provided detailed claims records for each inpatient and outpatient medical encounter and for each prescription filled and included *International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM)*[19] codes and *Current Procedural Terminology (CPT)* codes.[20] We used *ICD-9-CM* codes to identify relevant diagnoses and *CPT* codes to categorize face-to-face physician visits.

Measures

We used the following *ICD-9-CM* codes to identify encounters with any mental health component: 296 (bipolar disorder), 300 (anxiety disorder), 304 (opiate dependence), 305 (alcohol abuse), 309 (mood disorder), and 311 (major depression). For each worker, we totaled the number of encounters an individual had in each year in 2 domains: outpatient physician visits (including emergency room visits) and inpatient hospitalizations. For outpatient visits, we only considered encounters that had a face-to-face visit with a doctor, as indicated by the *CPT* code.

We used the pharmacy claims data to calculate use of mental health–related medications, according to the number of days' supply that an individual filled in a year for 4 categories of medications: opiates, antidepressants, sleep aids, and anxiolytics (Appendix A, Table A, available as a supplement to the online version of this article at http://www.ajph.org, lists the drugs in each class). We included opiates because they may be used for self-medication, especially among individuals with a history of substance abuse.[21] We also

included sleep aids because insomnia often precedes the onset of depression, and they are often prescribed for insomnia related to depression.[22] We assumed that an increase in supply was directly related to an increase in the use of these medications, so we refer generally to medication use here. Although many of these medications are prescribed for multiple diagnoses, our analysis examined deviations from the mean use for each person across the years. Therefore, if individuals consistently used these drugs for other purposes, that would not affect our results. The analysis only captured marked changes in use of these drugs.

The period of our study was marked by a rapid change in the national unemployment rate. We accounted for changes in regional labor market conditions by including the yearly county-level unemployment rate from the Bureau of Labor Statistics[23] as a control variable in all of our models. We used unemployment rates for the county in which each plant was located.

We used the personnel data set to identify plants experiencing high layoff rates. If a plant had a mass termination event in which 40 or more employees were laid off on a single day, we considered it a high-layoff plant. We assumed that surviving employees at these 7 plants experienced greater job insecurity than did those at the 18 other plants. We used mass termination events to categorize job instability in previous studies.[8,11]

Data Analysis

We described selection on health and mental health in particular to establish that continuously employed workers were healthier than their counterparts who dropped out of the sample. We categorized workers' baseline health status in 2007 with a health risk score, computed with a third-party algorithm (DxCG software, Verisk Health Inc, Waltham, MA), which uses an individual's historical *CPT* and *ICD-9-CM* codes and utilization of health care services to determine a risk stratification score. This score has been used to adjust for underlying health, particularly in health services research.[24–26] A score of 1 indicates that the individual's health expenditures are likely to fall at the mean in the following year. Each unit increase predicts a 100% increase in expenditures above the mean. We also compared mental health–related

inpatient and outpatient visits and use of the 4 classes of mental health–related medications for workers who remained employed and those who left in 2008 to 2010.

Our primary analysis involved the cohort of continuously employed and insured workers. We used piecewise regression, which partitioned the data into 2 intervals, allowing us to estimate a separate trend line for each interval. The boundaries between the segments are known as breakpoints. We modeled the breakpoint in 2009, the peak of major layoffs at the company and the nadir of the gross national product nationally, comparing trends in 2007 to 2008 with those in 2009 to 2010. We used this breakpoint in previous studies of the cohort,[8,11] and it coincided with a company press release in January 2009 announcing plans for a reduction in the workforce of 13%, citing "extraordinary times requiring extraordinary actions."[27] Although layoffs at the company ended in March 2010, hiring and pay freezes continued at least through 2013. We therefore investigated the medium-term impacts by extending the postrecession segment from 2009 to 2012. We also included county-level unemployment rates to account for changes in the regional labor market.

Because our data included multiple observations for each individual—that is, 1 observation per person per year—we controlled for time-invariant characteristics by including a fixed-effects parameter at the individual level. The inclusion of individual-level fixed effects in the model allowed us to use only within-individual variation to identify discontinuous changes in utilization of mental health services and medications after 2009. The inclusion of the fixed effect precluded controlling for age directly, but all specifications accounted for aging by including a second- and third-degree polynomial for age. Robust standard errors clustered at the individual level. We assessed heterogeneity in employees' responses to the recession through the use of an interaction term between the time trend variable and whether an individual's plant experienced a mass termination event.

RESULTS

Table 1 presents the sample characteristics for 3 groups: (1) 11 625 workers who were active on January 1, 2007, and continuously

TABLE 1—Characteristics of Workers in Continuously Employed Cohorts and Those Employed in 2007 but Terminated Before 2010: 2007–2012

Characteristic	2007–2010 Cohort,[a] No. or % or Mean ±SD	2007–2012 Cohort,[a] No. or % or Mean ±SD	Workers Laid Off in 2008–2010, No. or % or Mean ±SD
Sample size	11 625	10 242	2946
Female	20.1	19.3	25
Age in 2007, y	45.6 ±9.0	45.2 ±8.7	48.7 ±12.2
Race			
White	82	82	80.9
Black	8.7	8.6	9.4
Hispanic	6.3	6.3	6.5
Other	3	3.1	3.2
2007 Risk score	1.0 ±1.0	0.98 ±0.96	1.42 ±1.95
Employed at high-layoff plant[b]	55.9	56.4	52.6

[a]Inclusion criteria were continuous employment and continuous insurance coverage during study period.
[b]Plant that laid off ≥ 40 employees in 1 day.

employed and insured from 2007 to 2010; (2) 10 242 workers who were active on January 1, 2007, and continuously employed and insured from 2007 to 2012; and (3) 2946 workers who were active on January 1, 2007, and whose contract of employment was terminated between 2008 and 2010. The second group was a subset of the first group. The workers in groups 1 and 2 were predominantly White men, aged 45 years on average; 56% worked at high-layoff plants. These workers' average risk score was 1, suggesting that their overall health care utilization in 2007 fell at the mean of a working aged population. By contrast, the workers who left in 2008 to 2010 (group 3) were on average 3 years older, were more likely to be female, and had higher risk scores in 2007 (all, P < .001).

Table A2 (available as an online supplement) shows baseline differences in mental health utilization between those who left the firm and those who remained, confirming that the workers who left had higher mental health inpatient and outpatient utilization in 2007. They also used more antidepressants, anxiolytics, and opiates. Results presented here focus only on the continuously employed and insured workforce.

Changes in Utilization of Mental Health Services After 2009

Table 2 presents results on inpatient visits with a mental health–related diagnosis for the 2007 to 2010 and 2007 to 2012 cohorts.

We found a marginally significant increase in inpatient utilization in 2009 to 2010 from 2007 to 2008 (b = 0.00189; P = .078). The magnitude of the postrecession trend line was about 4 times as great as that of the prerecession trend line in the short term. In the medium term, the prerecession and postrecession trends were almost identical, suggesting that the increase in inpatient visits was abrupt and short lived.

Table 2 also shows models that included an interaction term for working at a high-layoff plant. We found no difference in the trend among those with higher job insecurity. We documented that changes in county-level unemployment rate were related to decreases in mental health inpatient visits.

Table 3 presents results for the number of outpatient visits with a mental health–related diagnosis. The results suggested a statistically significant increase in the trends in outpatient utilization in 2009 to 2010 over 2007 to 2008. The increase in the trend remained elevated and significant, but the magnitude was substantially reduced in a comparison of the yearly increases of 2009 to 2012 and 2007 to 2008. These results were driven by a decreasing prerecession trend and a discontinuous and increasing postrecession trend. We observed no difference between employees at high-layoff plants and those at other plants. We also documented that changes in county-level unemployment rates were

related to increases in mental health outpatient visits. When we allowed for differences by plant-level layoffs, the magnitude between increases in unemployment rates and increases in mental health outpatient visits was similar across both the 2007 to 2010 and the 2007 to 2012 periods.

Changes in Utilization of Mental Health Medications After 2009

Table 4 presents changes in the supply of opiates, antidepressants, sleep aids, and anxiolytics. We examined the number of days' supply of each drug category separately, and we examined differential patterns among workers who worked in high-layoff plants. Workers used more opiates, antidepressants, sleep aids, and anxiolytics in 2009 to 2010 than in 2007 to 2008. The increases in use of opiates and anxiolytics were only marginally significant. Opiate use increased 8.8% a year (a figure derived from the mean initial use of 8.8 pills), or almost 5 times the prerecession trend. We found a 13% increase in antidepressant use (derived from the mean initial use of 27.1 pills). The increasing trend in the use of antidepressants in the postrecession period was particularly notable because of the decreasing trend in antidepressant use before the recession.

Workers increased their use of sleep aids by 23% per year (derived from the mean initial use of 4.4 pills). The difference in the trend for sleep aids was driven by a small increasing trend in the use of sleep aids in the postrecession period and a large decreasing trend before the recession. The 11% increase in use of anxiolytics (derived from the mean initial use of 7.2 pills) was almost 5 times the prerecession trend. Use of antidepressants was also statistically significantly higher in high-layoff plants than in other plants. We found no difference in trends for opiates, sleep aids, or anxiolytics at high-layoff plants. Results also suggested that changes in county-level unemployment rates were robustly related to increased use of opiates, and sleep aids.

In the medium term, our results suggested that the increase in the trend for antidepressants and sleep aids remained significant among the 2007 to 2012 cohort, but the magnitude of the increase was smaller. The increase in use of antidepressants in high-layoff plants remained significant, though the

TABLE 2—Mental Health Inpatient Utilization Among Continuously Employed and Insured Workers: 2007–2012

Variable	Yearly Mental Health Inpatient Visits			
	2007–2010 Cohort, b (95% CI)	2007–2012 Cohort, b (95% CI)	2007–2010 Cohort, With Interactions at High-Layoff Plants,[a] b (95% CI)	2007–2012 Cohort, With Interactions at High-Layoff Plants,[a] b (95% CI)
Time trend before 2009	0.00056 (–0.00034, 0.00146)	0.00035 (–0.00047, 0.00117)	0.00087 (–0.00034, 0.00208)	0.00051 (–0.00065, 0.00167)
Time trend after 2009	0.00245* (0.00058, 0.00433)	0.00036 (–0.00010, 0.00083)	0.00126 (–0.00100, 0.00351)	0.00004 (–0.00061, 0.00069)
Interaction terms: job security				
Before 2009 x high layoff			–0.00046 (–0.00170, 0.00078)	–0.00037 (–0.00153, 0.00079)
After 2009 x high layoff			0.00215 (–0.00144, 0.00575)	0.00058 (–0.00026, 0.00143)
High layoff			0.00027 (–0.00157, 0.00210)	–0.00032 (–0.00193, 0.00129)
Unemployment rate	–0.00029* (–0.00054, –0.00005)	–0.00011 (–0.00031, 0.00010)	–0.00031* (–0.00057, –0.00006)	–0.00009 (–0.00028, 0.00011)
Constant	0.00423 (–0.00190, 0.01037)	0.00082 (–0.00249, 0.00413)	0.00447 (–0.00181, 0.01074)	0.00087 (–0.00267, 0.00442)
		Model comparisons		
Difference in trend, before vs after recession	0.00189	0.00028		

Note. CI = confidence interval. Analyses were conducted with piecewise regression with a discontinuity in 2009, with fixed effects at the individual level. Models controlled for age squared and age cubed. The 2007–2010 cohort had 46 500 observations for 11 625 individuals; the 2007–2012 cohort had 61 452 observations for 10 242 individuals.
[a] A high-layoff plant laid off ≥ 40 employees in 1 day (n = 7). Reference group = all other plants (n = 18).
*$P < .05$.

magnitude was diminished. We found no difference in trend for sleep aids, anxiolytics, or opiates at high-layoff plants in the longer period. However, in the models that accounted for differences by plant-level job insecurity, changes in county-level unemployment rates were robustly related to increased use of opiates and sleep aids.

DISCUSSION

We examined changes in utilization of mental health services and medications in a cohort of continuously employed and insured workers employed at a firm that experienced significant downsizing events during the 2008 to 2009 Great Recession. We documented that remaining workers had better overall health and significantly less utilization of mental health services and medications in the years before the recession.

Despite their lower use of mental health services and medications at baseline, workers who remained employed increased their utilization of inpatient and outpatient mental health

TABLE 3—Mental Health Outpatient Utilization Among Continuously Employed and Insured Workers: 2007–2012

Variable	Yearly Mental Health Outpatient Visits			
	2007–2010 Cohort, b (95% CI)	2007–2012 Cohort, b (95% CI)	2007–2010 Cohort, With Interactions at High-Layoff Plants,[a] b (95% CI)	2007–2012 Cohort, With Interactions at High-Layoff Plants,[a] b (95% CI)
Time trend before 2009	–0.0107*** (–0.0171, –0.0043)	–0.0051 (–0.0112, 0.0010)	–0.0102** (–0.0172, –0.0032)	–0.0093* (–0.0168, –0.0017)
Time trend after 2009	0.0085* (0.0006, 0.0163)	0.0060*** (0.0029, 0.0092)	0.0066 (–0.00353, 0.0166)	0.0091 (–0.0017, 0.0199)
Interaction terms: job security				
Before 2009 x high layoff			0.0006 (–0.0067, 0.0079)	0.0010 (–0.0067, 0.0087)
After 2009 x high layoff			0.0037 (–0.0120, 0.0193)	–0.0000 (–0.0167, 0.0167)
High layoff			0.0173** (0.0065, 0.0281)	0.0169** (0.0056, 0.0283)
Unemployment rate	0.0050*** (0.0025, 0.0076)	0.0029* (0.0005, 0.0053)	0.0046*** (0.0021, 0.0072)	0.0042** (0.0015, 0.0069)
Constant	0.0331 (–0.0059, 0.0722)	0.0631** (0.0222, 0.1041)	0.0298 (–0.0089, 0.0685)	0.0395 (–0.0029, 0.0819)
		Model comparisons		
Difference in trend, before vs after recession	0.0192***	0.0112**		

Note. CI = confidence interval. Analyses were conducted with piecewise regression with a discontinuity in 2009, with fixed effects at the individual level. Models controlled for age squared and age cubed. The 2007–2010 cohort had 46 500 observations for 11 625 individuals; the 2007–2012 cohort had 61 452 observations for 10 242 individuals.
[a] A high-layoff plant laid off ≥ 40 employees in 1 day (n = 7). Reference group = all other plants (n = 18).
*$P < .05$; **$P < .01$; ***$P < .001$.

TABLE 4—Mental Health Medication Supply for Workers in 2007–2010 and 2007–2012 Continuously Employed Cohorts

Variable	Yearly Medication Count				Yearly Medication Count, High-Layoff Plants[a]			
	Opiates, b (95% CI)	Antidepressants, b (95% CI)	Sleep Aids, b (95% CI)	Anxiolytics, b (95% CI)	Opiates, b (95% CI)	Antidepressants, b (95% CI)	Sleep Aids, b (95% CI)	Anxiolytics, B (95% CI)
	2007–2010 Cohort							
Time trend before 2009	0.208 (–0.435, 0.852)	–0.289 (–1.545, 0.966)	–0.749** (–1.252, –0.246)	0.193 (–0.371, 0.756)	0.120 (–0.596, 0.837)	–0.0868 (–1.426, 1.252)	–0.656* (–1.180, –0.132)	0.178 (–0.397, 0.752)
Time trend after 2009	0.985*** (0.439, 1.531)	3.250*** (2.254, 4.246)	0.248 (–0.148, 0.644)	0.963*** (0.440, 1.486)	0.654 (–0.083, 1.390)	1.418* (0.060, 2.777)	–0.142 (–0.692, 0.409)	0.723 (–0.039, 1.485)
Interaction terms: job security								
Before 2009 x high layoff					0.241 (–0.407, 0.889)	–0.335 (–1.553, 0.884)	–0.136 (–0.669, 0.397)	0.0405 (–0.513, 0.593)
After 2009 x high layoff					0.606 (–0.426, 1.638)	3.283*** (1.304, 5.261)	0.702 (–0.068, 1.471)	0.431 (–0.604, 1.466)
High layoff					1.078 (–0.822, 2.978)	1.976 (–1.372, 5.323)	1.100 (–0.023, 2.224)	0.065 (–1.589, 1.719)
Unemployment rate	0.696*** (0.410, 0.983)	0.474 (–0.025, 0.973)	0.292** (0.104, 0.481)	0.129 (–0.105, 0.362)	0.675*** (0.391, 0.960)	0.468 (–0.036, 0.973)	0.285*** (0.094, 0.476)	0.125 (–0.116, 0.366)
Constant	–5.060* (–9.628, –0.491)	–5.779 (–14.729, 3.170)	–5.165** (–8.480, –1.850)	–4.528* (–8.536, –0.519)	–5.365* (–9.947, –0.783)	–6.486 (–15.554, 2.581)	–5.524*** (–8.881, –2.168)	–4.527* (–8.485, –0.568)
	Model comparisons							
Difference in trend, before vs after recession	0.777[b]	3.540***	0.997***	0.770[c]				
	2007–2012 Cohort							
Time trend before 2009	0.927** (0.353, 1.501)	0.239 (–0.987, 1.466)	–0.412** (–0.881, 0.056)	0.357 (–0.177, 0.892)	0.554 (–0.092, 1.201)	–0.240 (–1.594, 1.113)	–0.374 (–0.878, 0.130)	0.154 (–0.431, 0.738)
Time trend after 2009	0.999*** (0.697, 1.302)	2.583*** (1.992, 3.175)	0.273** (0.069, 0.476)	0.495*** (0.208, 0.782)	0.784*** (0.389, 1.179)	1.528*** (0.737, 2.319)	0.114 (–0.135, 0.364)	0.404* (0.015, 0.792)
Interaction terms: job security								
Before 2009 x high layoff					0.476 (–0.184, 1.135)	–0.076 (–1.400, 1.248)	–0.185 (–0.741, 0.370)	0.284 (–0.309, 0.876)
After 2009 x high layoff					0.421 (–0.112, 0.953)	2.052*** (0.993, 3.110)	0.305 (–0.059, 0.670)	0.179 (–0.339, 0.696)
High layoff					1.268 (–0.536, 3.073)	2.330 (–1.165, 5.825)	1.072 (–0.048, 2.193)	0.792 (–0.923, 2.506)
Unemployment rate	0.291* (0.062, 0.519)	0.214 (–0.245, 0.674)	0.155 (–0.006, 0.315)	0.003 (–0.198, 0.203)	0.336** (0.107, 0.564)	0.437 (–0.028, 0.902)	0.183* (0.021, 0.346)	0.022 (–0.187, 0.230)
Constant	–1.968 (–6.626, 2.689)	–5.54 (–15.028, 3.949)	–3.976 (–7.515, –0.436)	–4.002* (–7.993, –0.011)	–3.040 (–7.850, 1.770)	–8.677 (–18.353, 0.999)	–4.706* (–8.375, –1.038)	–4.586* (–8.604, –0.567)
	Model comparisons							
Difference in trend, before vs after recession	0.072	2.344**	0.685*	0.138				

Note. CI = confidence interval. Analyses were conducted with piecewise regression with a discontinuity in 2009, with fixed effects at the individual level. Models controlled for age squared and age cubed. The 2007–2010 cohort had 46 500 observations for 11 625 individuals; the 2007–2012 cohort had 61 452 observations for 10 242 individuals.

[a]A high-layoff plant laid off ≥ 40 employees in 1 day (n = 7). Reference group = all other plants (n = 18).

[b]Approaching significance at *P* = .057.

[c]Approaching significance at *P* = .052.

*P < .05; **P < .01; ***P < .001.

services immediately after the downturn. Consistent with this evidence, we also found an increase in the use of mental health–related medications, specifically opiates, antidepressants, sleep aids, and anxiolytics, for all workers. When we looked at a longer period, including data for those who remained working in 2011 to 2012, we observed no difference in the rate of utilization of mental health–related inpatient visits. Use of antidepressants and sleep aids was still higher among all workers, and workers at high-layoff plants still used more antidepressants, though the magnitudes were diminished. We confirmed that beyond the local plant environment, county-level unemployment rates were robustly associated with increases in mental health outpatient visits and medication use.

Our analysis helps reconcile divergent results from 2 previous studies we conducted among the same population of workers. One study found an insignificant increase in new depression diagnoses at high-layoff plants,[11] and another examined self-reported work stress and found it elevated at high-layoff plants.[8] In the analysis we report here, we found an increase in the rate of mental health services in the short run and a prolonged increase in antidepressant use in high-layoff plants. This suggests that new diagnoses for depression may be too stringent a measure to capture subtler changes in psychological distress, but that some mental health deterioration occurred in our cohort. This is particularly important because surviving workers should have been the least affected by the economic downturn, yet our study showed that this healthy population also experienced adverse mental health outcomes.

Few studies have examined mental health changes in working populations in the context of the Great Recession. Consistent with our findings, the American Panel Survey found that in 2008 to 2009 one third of Americans reported having problems with sleeping; in late 2010, this figure was one fourth.[28] Our finding about changes in unemployment rate and use of mental health medication was both novel and consistent with previous literature. A recent study found increases in opiate consumption in states with higher unemployment rates between 2007 and 2010 in the United States, but no increase in antidepressants as a class.[29]

Our study substantiated results from other studies regarding opiates, but we used more stringent methods—more localized change in unemployment, a sample comprising only continually employed populations, and analysis of within-person variation only—and found an increase in the use of sleep aids.

Our study had several advantages over previous studies. First, few studies have the detailed data necessary to examine small changes in utilization of mental health services and medications over time. Our data contained multiple observations per worker, allowing for the inclusion of individual-level fixed effects to estimate changes in utilization of mental health services and medications after 2009 through analysis of within-person variation only. This model was conservative because it controlled for both area-level unemployment rates and local plant-level employment conditions.

Another advantage was our large sample size, combined with continuous measures of the outcomes. Although some detailed panel studies with self-reported depression scales have been conducted, such as the Michigan Recession and Recovery study[30] and the American Life Panel study,[31] they had relatively small sample sizes and did not continuously measure outcomes over longer periods. In light of the moderate and dissipating effect sizes of mental health changes in working populations, only a large data set with continuous measures would allow differentiation of short- and medium-term effects.

Limitations

Our sample comprised only workers in the heavy and light manufacturing industries, which were heavily affected by the recent recession. It could be that employees in other sectors of the economy had different experiences. Also, although we examined yearly medication supply, we were unable to determine whether employees actually took the prescriptions that were filled. We were not able to determine whether increases in medication use were driven by workers with preexisting mental health problems, because our sample included very few such people. The fixed-effect model captured only increases in use among new users and increases or decreases in existing users.

Our results may have underestimated the true effect. We selected workers who

maintained employment throughout the recession and therefore had access to insurance, had better overall health than their laid-off colleagues, and used mental health services less than their laid-off colleagues in the prerecession period. Other studies have shown that remaining workers are healthier,[11] and population-level surveys show that employed populations have generally better mental health.[28] This selection could limit generalization to the less stably employed general US working population, which may have experienced greater effects from the recession.

Conclusions

Our study provides evidence that even those who remained employed during the Great Recession experienced worsening mental health. The results suggested a modest increase in use of medications and an increase in mental health–related inpatient and outpatient visits in the short term. Our measure of medication supply was likely sensitive to small changes in mental health and was consistent with the idea that medication use is a coping mechanism in times of uncertainty. Our results suggested that the mental health consequences of the recent recession on the US workforce were widespread.

Although these mental health issues may be resolving as the economy emerges from the recession, other downturns will undoubtedly occur. Employers should be aware of the negative consequences of layoffs on their remaining workforce and their work culture. In such times, employers can mitigate the negative consequences of layoffs by promoting and providing increased support services, such as employee assistance programs and targeted wellness programs. In addition, they should communicate upcoming layoffs transparently. Disclosing the scope and duration of the layoffs may help limit uncertainty and mental health distress that remaining workers face. During recessions, physicians should also be more vigilant in assessing patients' work environment, including its stability, when diagnosing and treating mental health concerns. ∎

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Contributors

S. Modrek originated the study, searched the literature, analyzed and interpreted the data, and wrote the article. R. Hamad and M. R. Cullen helped interpret data and write the article.

Human Participant Protection

The Stanford University institutional review board provided ethical approval for this study. Individual consent was waived because of an epidemiological exemption.

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