finding

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Joel Goh, Jeffrey Pfeffer, & Stefanos A. Zenios

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Extensive research focuses on the causes of workplace-induced stress. However, policy efforts to tackle the ever-increasing health costs and poor health outcomes in the United States have largely ignored the health effects of psychosocial workplace stressors such as high job demands, economic insecurity, and long work hours. Using meta-analysis, we summarize 228 studies assessing the effects of ten workplace stressors on four health outcomes. We find that job insecurity increases the odds of reporting poor health by about 50%, high job demands raise the odds of having a physician-diagnosed illness by 35%, and long work hours increase mortality by almost 20%. Therefore, policies designed to reduce health costs and improve health outcomes should account for the health effects of the workplace environment.

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Confronting ever-rising health benefits costs, Stanford University in 2007 began a sustained effort to slow the growth of its medical bills. Seeking particularly to help its workforce prevent or better control lifestyle-related diseases such as type 2 diabetes, the university created an employee wellness program. The program included modest financial incentives for participation (approximately $500 per participant in 2014); annual health screenings; a health assessment and behavior questionnaire; and opportunities to participate in exercise, nutrition, and stress-reduction classes.

Although wellness programs are a common policy response to employee health issues, evidence for their effectiveness is mixed. One recent meta-analysis reported health care cost savings of more than $3 for every $1 invested,[1] but an analysis at the University of Minnesota found no evidence that a lifestyle management program reduced health care costs.[2] According to a 2013 RAND Corporation report,[3] about half of all U.S. employers with 50 or more employees now offer some form of wellness promotion program. Although the RAND report, consistent with other empirical evidence,[4,5] noted some effects of these programs on lifestyle choices such as diet and exercise, the study reported that fewer than half of employees in workplaces offering wellness programs participated in them, in part because of rigid work schedules. The RAND report also contained separate case studies of five large U.S. employers. Using the data from these case studies,

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the authors of the report found that the average difference in health care costs between people who participated in such programs and those who did not was just $157 annually, an amount that is neither substantively nor statistically significant.

Why might such policy interventions not consistently show better results? One answer could be variation in services. Some programs include financial incentives to achieve specific biometric goals, whereas others do not. Some programs include health-related activities such as exercise and yoga classes, whereas others include only the assessments. There are also important differences in the workplace cultures in which such programs are implemented. For example, some companies emphasize employee well-being as a source of competitive advantage, whereas others push employee cost reduction. These different cultures and program elements could produce different health outcomes.[6]

But another possibility is that with their focus on individual behavior, wellness interventions miss an important factor affecting people's health: the work environment. Management practices in the workplace can either produce or mitigate stress related to long working hours, heavy job demands, an absence of job control, a lack of social support, and pervasive work–family conflict. More than 30% of respondents to a Stanford survey, for instance, reported that they experienced stress at work of sufficient severity to adversely affect their health.[7]

It is scarcely news that stress negatively affects health both directly[8,9] and indirectly through its influence on individual behaviors such as alcohol abuse, smoking, and drug consumption.[10–14] There is also recognition that stress produced in the workplace is related to numerous health outcomes, including increased risks of cardiovascular disease, depression, and anxiety. The physiological pathways through which some of these effects operate have been demonstrated.[15] Work contexts matter for health.[16]

Nonetheless, U.S. employers and policymakers have paid scant attention to the connections between workplace conditions and health. There has been somewhat more policy attention in Europe. Many European countries have laws that seek to more stringently regulate work hours, promote employment stability, and reduce work–family conflict.[17]

In the United States, the role of the work environment in workers' health has gained some attention through research sponsored by the National Institute for Occupational Safety and Health.[18] Nevertheless, most policy discussions and resources remain devoted to the relatively narrow objectives of promoting physical workplace safety (for example, reducing exposure to harmful chemicals) and offering health-promotion activities. Although both focuses are important, employers and policymakers have not sufficiently considered broader dimensions of the workplace environment that are affected by employer decisions and that impact the psychological and social well-being of employees—choices concerning layoffs, work hours, flexibility, and medical insurance benefits, for example.

Sustained policy attention to such issues will almost certainly require (a) assessing the relative size and importance of the health effects of various workplace conditions, (b) collecting data to enable regular analysis of the relationship between workplace conditions and health, and (c) reporting the incidence of exposure to unhealthy workplace conditions. It is almost impossible to overstate how the detailed reporting of job-related physical injury and death rates stimulated both policy attention and consistent improvement in physical working conditions over time.

In this article, we quantitatively review the extensive evidence on the connections between workplace stressors and health outcomes. Our results suggest that many workplace conditions profoundly affect human health. In fact, the effect of workplace stress is about as large as that of secondhand tobacco smoke, an exposure that has generated much policy attention and efforts to prevent or remediate its effects.

Why Health and Health Costs Are Important

The United States spends a higher proportion of its gross domestic product on health care than do other advanced industrialized economies and about twice as much per capita as 15 other rich industrialized nations. The United States has also experienced a higher growth rate in health care spending than other countries.[19] But despite higher U.S. health care spending, life expectancy is lower and infant mortality is higher than in countries that spend far less on health care, including Japan, Sweden, and Switzerland. According to 2013 data, the United States ranks 26th in life expectancy, below the average of member countries that make up the Organisation for Economic Co-operation and

Development, which are mostly high-income, developed nations.[20]

Health matters to individuals, to their employers, and to governments. Poor health takes a heavy toll on sick individuals and their families in many ways, including financially. One study reported that in 2001, almost half of all bankruptcies were related to medical bills; by 2007, that proportion had grown to 62%.[21] Other studies have found that even people with health insurance face increasing financial stress from health care costs.[22]

Employers care about health costs. They pay a significant portion of Medicare and Medicaid taxes and more than half of private health insurance premiums.[23] Ever-growing health care bills constrain employers' ability to offer raises, hire additional people, and make the capital investments necessary for long-term growth.

Governments likewise worry about the ever-increasing share of their budgets that is diverted away from other public purposes and toward health costs for both active employees and retirees.[24] Still, many people reasonably believe that a healthy and long life is a fundamental human right.[25]

The Health Effects of Workplace Stressors

Analyzing Workplace Stressors

We examined the effect of workplace stressors on health through an analytical procedure known as *meta-analysis,* which statistically summarizes the results of multiple studies. We identified these studies by what is known as a *systematic literature review,* in which we searched public scientific databases for research articles that contained keywords such as *work hours, overtime, job control, job security,* and *layoff,* among others (details are provided in the Supplemental Material). We used predefined criteria to winnow the list of studies down to a smaller set of relevant studies. This procedure is widely accepted as a way of minimizing researchers' biases in searching for the studies to include in a review.

Authors of numerous reviews and meta-analyses have examined the health effects of individual workplace stressors such as job insecurity,[26–28] long work hours,[29,30] lack of social support in the workplace,[31] and psychological demands and job discretion.[32–34] Narrative reviews (that is, reviews that do not use systematic procedures of study selection) have revealed consistent evidence in the literature that work stress is associated with a variety of negative health outcomes, including cardiovascular disease, clinical depression, and death.[15] However, to our knowledge, no researcher has used common meta-analysis methods and criteria to investigate the health effects of a fairly comprehensive set of workplace stressors, something that is necessary to estimate the relative importance of various workplace conditions for health. We perform such a meta-analysis by analyzing the effects of 10 different stressors on four health outcomes, thus allowing policymakers to weigh the magnitude of each stressor's effects.

Our objective was to analyze work stressors that affect people's psychological and physical health and that can be reasonably addressed by either public policy or managerial interventions. We focused our analysis on single stressors rather than on composites because it is usually easier for employers or policymakers to address workplace problems individually than to tackle many at once. Also, minimizing individual stressors should naturally lessen the impact of any broader composite that includes those individual stressors.

We examined numerous workplace conditions presumed to undermine health: long working hours[35] and shift work;[36] work–family conflict;[37,38] job control, which refers to the level of discretion that employees have over their work;[39,40] and job demands.[41,42] The combination of these latter two stressors is referred to as *job strain*.[43] We also examined workplace conditions that might mitigate the negative effects of job stressors. These included social support and social networking opportunities;[44,45] organizational justice, which refers to the perceived level of fairness in the workplace;[46] and availability of health insurance, which affects access to health care and preventive screenings and, therefore, mortality.[47] Finally, we assessed what may be the most important factor of all: whether a person is employed at all. Research consistently finds that layoffs, job loss, and unemployment all have important effects on health,[48,49] as does economic insecurity.[50] Although macroeconomic conditions that are beyond the control of an employer undoubtedly influence this last stressor, the ultimate decision to lay off employees and thereby increase not only that individual's economic insecurity but the insecurity of others, including people who retain their jobs but see those jobs as being at risk, resides with the employer.

Our next step was to identify important health

outcomes. We focused on four outcomes typically used in studies of the health effects of the work environment: the presence of a diagnosed medical condition, a person's perception of being in poor physical health, a person's perception of having poor mental health, and death. Regardless of how these outcomes are measured, researchers usually classify them in an either–or way—for example, a person's health is either "poor" or "good." Studies repeatedly have shown that people's perception of their own health status—even when measured by a single survey question such as "How would you say your health in general is?"—significantly predicts the likelihood of subsequent illness and risk of death. That is true even when other health-relevant predictors such as marital status and age are taken into account.[51,52] Moreover, the predictive value of single-item measures of self-reported health holds across various ethnicities[53] and age groups.[54]

Our initial search yielded 741 studies that examined health effects of workplace conditions in some way. However, about two-thirds of those did not meet our criteria for inclusion in the meta-analysis—for example, because they were review articles or had too small a study sample. Our final sample included 228 studies. All 228 studies had sample sizes larger than 1,000, and 115 of them followed subjects over a period of time, so that researchers could relate workplace stressors to later health outcomes. (We furnish further details of our study selection criteria, meta-analytic methods, and statistical techniques in the online Supplemental Material, including a description of the analyses we conducted to ensure that our results were robust and that our estimates of effect sizes were not unduly inflated because of publication bias, the phenomenon in which positive and statistically significant results are more likely to get published.)

Increased Odds of Poor Health Outcomes

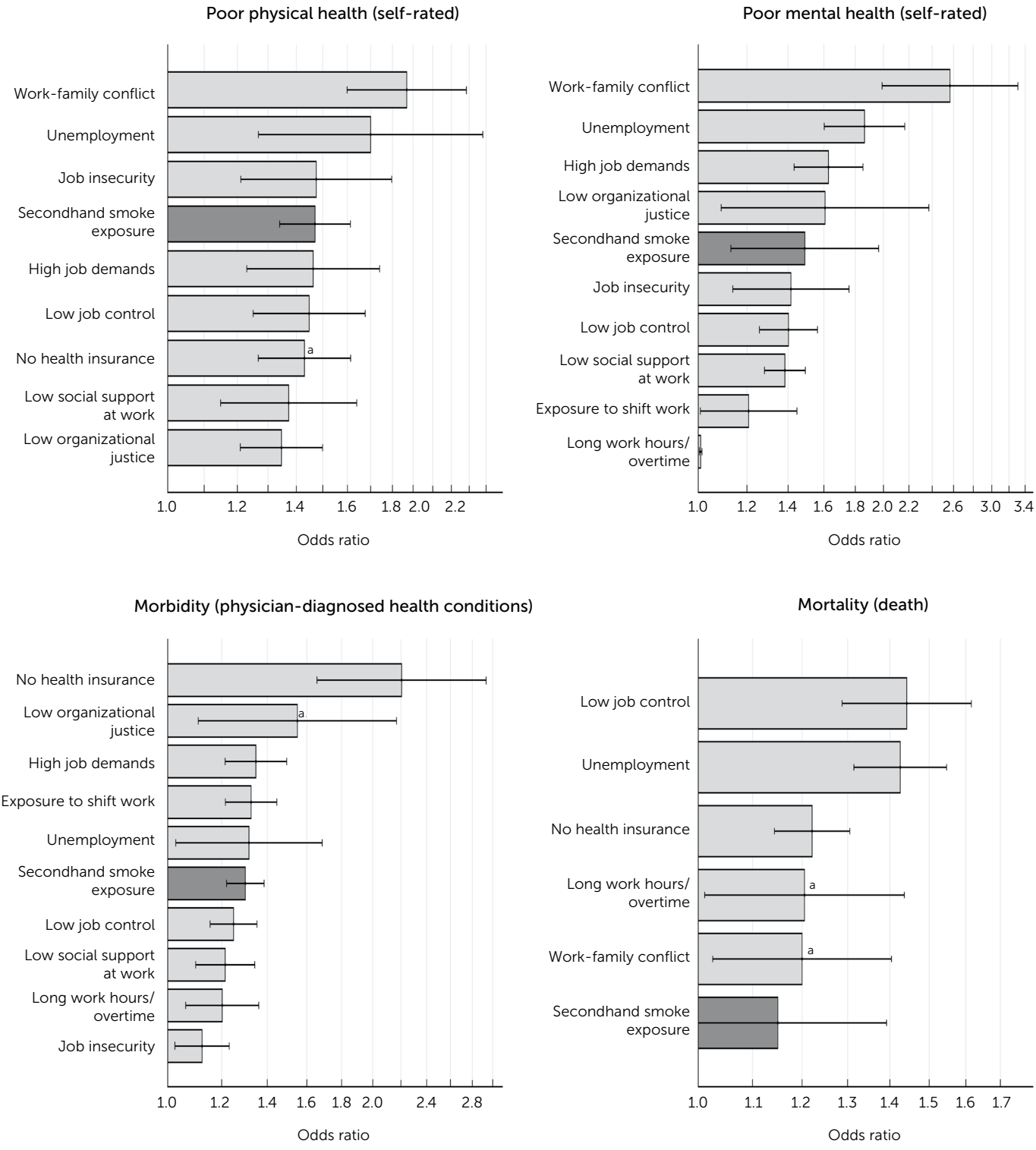
The four panels of Figure 1 show the statistically significant effects that work stressors had on the four categories of health outcomes: self-rated poor health, self-rated poor mental health, physician-diagnosed health conditions, and death. The sizes of these effects are presented as odds ratios, a statistical concept that may be new to some readers. An odds ratio conveys how the presence of one factor increases the odds of another factor being present. More concretely, the odds ratios in our study capture the extent to which individual workplace stressors increased the odds of having negative health outcomes. Knowing the scale helps make sense of these ratios. An odds ratio of 1 means an exposure produces no change in the odds of a negative health outcome occurring. An odds ratio of 2 means a stressor doubles the odds of a negative health outcome.

Odds ratios offered in isolation can be difficult to interpret. Therefore, to better convey the sizes of the effects we calculated, we compare them with something familiar to many: negative health outcomes from exposure to secondhand tobacco smoke. The odds ratios we found in the research literature on the effects of secondhand smoke were 1.47 for self-reported poor health.[55] In other words, exposure to secondhand tobacco smoke increases the odds that a person rates his or her general health as poor by almost 50%. In addition, odds ratios on the effects of exposure to secondhand smoke were 1.49 for self-reported mental health problems,[56] 1.30 for physician-diagnosed medical conditions,[57] and 1.15 for mortality.[58,59] (Although the biological pathway for the effect of secondhand smoke on mental health is less well established than it is for the other outcomes, some animal studies suggest that tobacco smoke can directly induce negative mood.[60])

The health effects of secondhand smoke exposure are widely viewed as sufficiently large to warrant regulatory intervention. For example, secondhand smoke is recognized as a carcinogen,[61] and smoking in enclosed public places, including workspaces, is banned in many states in the United States and in many other countries. The results of our meta-analysis show that workplace stressors generally increased the odds of poor health outcomes to approximately the same extent as exposure to secondhand smoke. These results support several conclusions:

- Unemployment and low job control have significant associations with all of the health outcomes, as does an absence of health insurance for those outcomes for which there are sufficient numbers of studies. With the exception of work–family conflict, all of the work stressors we examined are significantly associated with an increased likelihood of developing a medical condition, as diagnosed by a doctor.

Figure 1. Comparing health effects from work stressors to secondhand smoke exposure



Odds ratios higher than 1 indicate that the exposures listed here increased the odds of negative health outcomes. No health insurance, for instance, increased the odds of a physician-diagnosed health condition by more than 100%. Odds ratios for exposures marked with "a" were calculated with two or fewer studies and may be less reliable. Error bars are included to indicate standard errors. These bars indicate how much variation exists among data from each group. If two error bars are separated by at least half the width of the bars, this indicates less than a 5% probability that a difference was observed by chance (i.e., statistical significance at $p < .05$).

- Psychological and social aspects of the work environment, such as a lack of perceived fairness in the organization, low social support, work–family conflict, and low job control, are associated with health as strongly as more concrete aspects of the workplace, such as exposure to shift work, long work hours, and overtime.
- The association between workplace stressors and health is strong in many instances. For example, work–family conflict increases the odds of self-reported poor physical health by about 90%, and low organizational justice increases the odds of having a physician-diagnosed condition by about 50%.

Similar to the health effects of secondhand tobacco smoke, the effects of workplace practices are larger for self-reported physical and mental health and for physician-diagnosed illness than for mortality. This finding is not unexpected. Group differences in mortality rates typically take longer than other health outcomes to emerge, and therefore, other intervening factors that contribute to the hazard of mortality can dilute the effect of workplace stressors. Also, because of the longer time periods over which mortality effects occur, they are especially prone to bias because people who are sicker are more likely to drop out of the workforce (and therefore also out of the data set) during the research. Once individuals are out of the workforce, people also face a lower cumulative exposure to workplace stressors. Both of these factors could lead to an underestimation of effect sizes for mortality.

Policy Implications

Our primary conclusion that psychosocial work stressors are important determinants of health suggests several policy recommendations. First, if initiatives to improve employee health are to be effective, they cannot simply address health behaviors, such as reducing smoking and promoting exercise, but should also include efforts to redesign jobs and reduce or eliminate the workplace practices that contribute to workplace-induced stress.[62] For example, possible job redesigns could involve limiting working hours, reducing shift work and unpredictable working hours, and encouraging flexible work arrangements that help employees to achieve a better balance between their work life and their family life. A detailed discussion of interventions to prevent and remediate workplace stressors is beyond the scope of this article. We refer interested readers to a recent review[63] or RAND Europe report[64] for discussions of specific workplace intervention strategies.

We also recommend that greater effort be put forth to gather data on these workplace stressors and their health effects at both the national and the organizational levels of analysis. Despite the long-recognized and important health effects of workplace conditions, we are not aware of any nationally representative longitudinal data set in the United States that contains individual-level data on both workplace stressors and health outcomes. Such an effort would likely require (and benefit from) the involvement of government agencies that have interests in promoting worker or population health, such as the Occupational Safety and Health Administration or the Agency for Healthcare Research and Quality. In constructing such a data set, care should be taken to assess the exposures to these stressors at different points in time so that the cumulative exposure to stressors can be measured.

Organizations seeking to improve the health of their employees (and thereby reduce their health costs) need to have a complete picture of the work environment by assessing the prevalence of workplace stressors. Therefore, employers should measure both management practices and the workplace environment as well as employee health over time. This would permit employers to assess the effectiveness of any interventions, which they can do easily through self-rated health measures that are known to be effective proxies for actual health.

Because resources are limited and policymakers have to be selective about which stressors to target, our results can be used to identify where to focus attention. A simple way to do this would be to look at the effect sizes (odds ratios) from our analysis. Clearly, all else being equal, stressors with larger effect sizes contribute more toward poorer health outcomes. However, a more complete analysis should also incorporate two other pieces of information that are specific to the population in question: the rate of occurrence for each exposure and the baseline prevalence of each health outcome within that population.

To understand why these other two rates are important, consider a hypothetical example in which an exposure almost never occurs in a target population. Also consider another example in which the health outcome itself is so rare that any proportionate increase in its prevalence is insignificant in terms of raw numbers. In either case, even if the exposure has a large effect size on the outcome, the overall health impact of the exposure would be minimal in the study population as a whole. Therefore, in general, a stressor would have a large health impact in a population (and therefore represent a good candidate for policy attention) if (a) it has a high occurrence rate, (b) it has a large effect size on some health outcome, and (c) that health outcome also occurs with high baseline prevalence.

In another article,[65] we detailed how these pieces of information can be combined to generate new policy insights. In particular, we used data from the General Social Survey and the Current Population Survey to estimate the prevalence of workplace stressors in the United States and data from the Medical Expenditure Panel Survey and Vital Statistics Reports to estimate the prevalence of the negative health outcomes and their associated costs. We then combined these data through a mathematical model to estimate the annual excess mortality and costs that can be attributed to workplace stressors in the United States. Our analysis suggests that measures of workplace stressors can provide valuable information for insurers or employers who wish to perform more accurate risk adjustment and risk assessment. Of course, for this to be feasible, employers or insurers must first collect data on these aspects of the work environment.

Finally, given the pernicious health effects of workplace stressors, we recommend that policymakers consider increasing regulatory oversight of work conditions. Although some stressors—such as long work hours and shift work (through wage and hour laws and overtime rules)—are already subject to regulation (although there is some debate about the extent of the enforcement of these rules), other stressors could be fruitful avenues for attention. For example, employers could receive tax incentives if they offer work arrangements that support work–family balance and thereby minimize work–family conflict or, as in many European countries, incentives that would encourage more employment continuity and fewer layoffs. Any intervention in the labor market entails trade-offs, and we are not advocating a simplistic approach that focuses on health effects at the expense of other considerations. However, the lack of policy attention to psychological and social aspects of the workplace environment leaves many avenues for addressing health and health care costs untouched.

Furthermore, a host of nonregulatory actions can be taken to combat workplace stress. For example, policymakers could publish guidelines or best practices that could help raise awareness among employers and workers about the links between work stressors and health. Agencies or industry associations could encourage employers to take actions to help mitigate workplace stress and its causes. Similar actions have already been taken in the European Union,[17] where the European Framework Agreement on Work-Related Stress has led to concrete actions including "training, stress barometers, assessment tools for establishments . . . or general surveys to gather data and raise awareness."[66]

Limitations and Future Research

Our study's primary limitation is that all of the studies in our meta-analysis were observational (and not randomized controlled trials), which prevents us from making a strong causal inference linking workplace stressors to poor health outcomes. Furthermore, about half of the studies used cross-sectional designs, which are prone to biases from reverse causality. That is, these studies measured stressors in the same time window during which outcomes were measured, and the strength of associations could potentially be driven by poor health causing work stressors instead of work stressors causing poor health. Therefore, our results do not conclusively establish that these stressors cause poor health. Instead, they show that work stressors are strongly associated with poor health and suggest that these stressors could be fruitful targets for policy attention.

A second limitation is that our results represent averaged effect sizes. People will inevitably differ with respect to how each stressor affects each health outcome because they have different coping mechanisms and also differ in how they respond to workplace stress—for example, whether they believe that stress

has fundamentally positive or negative consequences.[67] The studies in our sample did not survey subjects on their attitudes toward stress, so we were not able to estimate the effects that different stress attitudes have on the results. Future researchers should assess how differential psychological beliefs about workplace stress affect the health effects of work stressors.

A final limitation of our study is that we focused exclusively on simple stressors that can be reasonably addressed by interventions. Consequently, we omitted work stressors such as effort–reward imbalance and job strain even though some studies suggest both of these stressors may have significant health effects,[43,68,69] perhaps with even larger odds ratios than we found in the studies we examined in this article. This limitation underscores a broader question that future researchers should address: Because many different and (at least partially) overlapping factors contribute to work stress, how do researchers assess the health effects of the totality of the work experience and design appropriate policies to cost-effectively increase employee health and productivity and reduce health care costs?

More than 100 years ago, after Upton Sinclair's book *The Jungle*[70] exposed dangerous conditions in meat-packing plants, public policy and voluntary company behavior began focusing on reducing occupational injuries and deaths, to great success. Although the dangers emanating from the psychological and social conditions of work are not as visible, they can also be quite harmful to health. Unless and until companies and governments more rigorously measure and intervene to reduce harmful workplace stressors, efforts to improve people's health—and their lives—and reduce health care costs will be limited in their effectiveness.

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supplemental material

- http://behavioralpolicy.org/supplemental-material
- Data, Analyses & Results
- Additional Figures
- Additional References

References

1. Baicker, K., Cutler, D., & Song, Z. (2010). Workplace wellness programs can generate savings. *Health Affairs, 29,* 304–311.
2. Nyman, J. A., Abraham, J. M., Jeffery, M. M., & Barleen, N. A. (2012). The effectiveness of a health promotion program after 3 years: Evidence from the University of Minnesota. *Medical Care, 50,* 772–778. http://dx.doi.org/10.1097/MLR.0b013e31825a8b1f
3. Mattke, S., Liu, H., Caloyeras, J. P., Huang, C. Y., Van Busum, K. R., Khodyakov, D., & Shier, V. (2013). *Workplace wellness programs study: Final report* (No. RR-254-DOL). Santa Monica, CA: RAND Corporation.
4. Hochart, C., & Lang, M. (2011). Impact of a comprehensive worksite wellness program on health risk, utilization, and health care costs. *Population Health Management, 14,* 111–116. http://dx.doi.org/10.1089/pop.2010.0009
5. Milani, R. V., & Lavie, C. J. (2009). Impact of worksite wellness intervention on cardiac risk factors and one-year health care costs. *American Journal of Cardiology, 104,* 1389–1392. http://dx.doi.org/10.1016/j.amjcard.2009.07.007
6. Caloyeras, J. P., Liu, H., Exum, E., Broderick, M., & Mattke, S. (2014). Managing manifest diseases, but not health risks, saved PepsiCo money over seven years. *Health Affairs, 33,* 124–131. http://dx.doi.org/10.1377/hlthaff.2013.0625
7. Stanford University, BeWell Program. (2011). *BeWell@Stanford 2011 annual report.* Retrieved from https://bewell.stanford.edu/sites/default/files/2011BeWellAnnualReport_0.pdf
8. Chandola, T., Brunner, E., & Marmot, M. (2006, March 4). Chronic stress at work and the metabolic syndrome: Prospective study. *British Medical Journal, 332,* 521–525. http://dx.doi.org/10.1136/bmj.38693.435301.80
9. Kivimäki, M., Leino-Arjas, P., Luukkonen, R., Riihimäi, H., Vahtera, J., & Kirjonen, J. (2002, October 19). Work stress and risk of cardiovascular mortality: Prospective cohort study of industrial employees. *British Medical Journal, 325,* 857–861. http://dx.doi.org/10.1136/bmj.325.7369.857
10. Harris, M., & Fennell, M. (1988). Perceptions of an employee assistance program and employees' willingness to participate. *Journal of Applied Behavioral Science*, *24,* 423–438.
11. Kouvonen, A., Kivimäki, M., Virtanen, M., Pentti, J., & Vahtera, J. (2005). Work stress, smoking status, and smoking intensity: An observational study of 46,190 employees. *Journal of Epidemiology and Community Health, 59,* 63–69. http://dx.doi.org/10.1136/jech.2004.019752

12. Nishitani, N., & Sakakibara, H. (2006). Relationship of obesity to job stress and eating behavior in male Japanese workers. *International Journal of Obesity, 30,* 528–533. http://dx.doi.org/10.1038/sj.ijo.0803153
13. Piazza, P. V., & Le Moal, M. (1998). The role of stress in drug self-administration. *Trends in Pharmacological Sciences, 19,* 67–74. http://dx.doi.org/10.1016/S0165-6147(97)01115-2
14. Wardle, J., Steptoe, A., Oliver, G., & Lipsey, Z. (2000). Stress, dietary restraint and food intake. *Journal of Psychosomatic Research, 48,* 195–202. http://dx.doi.org/10.1016/S0022-3999(00)00076-3
15. Ganster, D. C., & Rosen, C. C. (2013). Work stress and employee health: A multidisciplinary review. *Journal of Management, 39,* 1085–1122. http://dx.doi.org/10.1177/0149206313475815
16. Heaphy, E. D., & Dutton, J. E. (2008). Positive social interactions and the human body at work: Linking organizations and physiology. *Academy of Management Review, 33,* 137–162. http://dx.doi.org/10.5465/AMR.2008.27749365
17. Monks, J., de Buck, P., Benassi, A., & Plassmann, R. (2008). *Implementation of the European autonomous framework agreement on work-related stress.* Brussels, Belgium: European Social Partners.
18. National Institute for Occupational Safety and Health. (2012). *The research compendium: The NIOSH Total Worker Health Program: Seminal research papers 2012* (DHHS Publication No. 2012-146). Washington, DC: U.S. Department of Health and Human Services, Center for Disease Control and Prevention, National Institute for Occupational Safety and Health.
19. Kaiser Family Foundation. (2011). *Snapshots: Health care spending in the United States & selected OECD countries.* Retrieved from http://kff.org/health-costs/issue-brief/snapshots-health-care-spending-in-the-united-states-selected-oecd-countries/
20. Organisation for Economic Co-operation and Development. (2013). *Health at a glance 2013: OECD indicators.* Retrieved from http://dx.doi.org/10.1787/health_glance-2013-en
21. Himmelstein, D. U., Thorne, D., Warren, E., & Woolhandler, S. (2009). Medical bankruptcy in the United States, 2007: Results of a national study. *American Journal of Medicine, 122,* 741–746. http://dx.doi.org/10.1016/j.amjmed.2009.04.012
22. Banthin, J. S., Cunningham, P., & Bernard, D. M. (2008). Financial burden of health care, 2001–2004. *Health Affairs, 27,* 188–195. http://dx.doi.org/10.1377/hlthaff.27.1.188
23. Bureau of Labor Statistics. (2013). Employee benefits in the United States—March 2013 [News Release USDL-13-1344]. Retrieved from http://www.bls.gov/news.release/archives/ebs2_07172013.pdf
24. Fox, B. J., Taylor, L. L., & Yucel, M. K. (1993, Third Quarter). America's health care problem: An economic perspective. *Federal Reserve Bank of Dallas Economic Review*. Retrieved from http://www.dallasfed.org/assets/documents/research/er/1993/er9303b.pdf
25. Marmot, M., Allen, T., Bell, R., & Goldblatt, P. (2012, January 14). Building the global movement for health equity: From Santiago to Rio and beyond. *Lancet, 379,* 181–188. http://dx.doi.org/10.1016/S0140-6736(11)61506-7
26. Sverke, M., Hellgren, J., & Näswall, K. (2002). No security: A meta-analysis and review of job insecurity and its consequences. *Journal of Occupational Health Psychology, 7,* 242–264. http://dx.doi.org/10.1037/1076-8998.7.3.242
27. Virtanen, M., Kivimäki, M., Joensuu, M., Virtanen, P., Elovainio, M., & Vahtera, J. (2005). Temporary employment and health: A review. *International Journal of Epidemiology, 34,* 610–622. http://dx.doi.org/10.1093/ije/dyi024
28. Virtanen, M., Nyberg, S. T., Batty, G. D., Jokela, M., Heikkilä, K., Fransson, E. I., . . . Kivimäki, M. (2013). Perceived job insecurity as a risk factor for incident coronary heart disease: Systematic review and meta-analysis. *British Medical Journal*, *347*, Article f4746. http://dx.doi.org/10.1136/bmj.f4746
29. Sparks, K., Cooper, C., Fried, Y., & Shirom, A. (1997). The effects of hours of work on health: A meta-analytic review. *Journal of Occupational and Organizational Psychology, 70,* 391–408. http://dx.doi.org/10.1111/j.2044-8325.1997.tb00656.x
30. Bannai, A., & Tamakoshi, A. (2014). The association between long working hours and health: A systematic review of epidemiological evidence. *Scandinavian Journal of Work and Environmental Health, 40,* 5–18. http://dx.doi.org/10.5271/sjweh.3388
31. Viswesvaran, C., Sanchez, J. I., & Fisher, J. (1999). The role of social support in the process of work stress: A meta-analysis. *Journal of Vocational Behavior, 54,* 314–334. http://dx.doi.org/10.1006/jvbe.1998.1661
32. Pieper, C., Lacroix, A. Z., & Karasek, R. A. (1989). The relation of psychosocial dimensions of work with coronary heart disease risk factors: A meta-analysis of five United States data bases. *American Journal of Epidemiology, 129,* 483–494.
33. Bonde, J. P. E. (2008). Psychosocial factors at work and risk of depression: A systematic review of the epidemiological evidence. *Occupational and Environmental Medicine, 65,* 438–445. http://dx.doi.org/10.1136/oem.2007.038430
34. Kivimäki, M., Nyberg, S. T., Batty, G. D., Fransson, E. I., Heikkilä, K., Alfredsson, L., . . . Theorell, T. (2012, October 27). Job strain as a risk factor for coronary heart disease: A collaborative meta-analysis of individual participant data. *Lancet, 380,* 1491–1497. http://dx.doi.org/10.1016/S0140-6736(12)60994-5
35. Yang, H., Schnall, P. L., Jauregul, M., Su, T.-C., & Baker, D. (2006). Work hours and self-reported hypertension among working people in California. *Hypertension, 48,* 744–750. http://dx.doi.org/10.1161/01.HYP.0000238327.41911.52
36. Virkkunen, H., Härma, J., Kauppinene, T., & Tenkanen, L. (2006). The triad of shift work, occupational noise, and physical workload and risk of coronary heart disease. *Occupational and Environmental Medicine, 63,* 378–386. http://dx.doi.org/10.1136/oem.2005.022558
37. Frone, M. R. (2000). Work–family conflict and employee psychiatric disorder: The National Comorbidity Survey. *Journal of Applied Psychology, 85,* 888–895. http://dx.doi.org/10.1037/0021-9010.85.6.888
38. Frone, M. R., Russell, M., & Barnes, G. M. (1996). Work–family conflict, gender, and health-related outcomes: A study of employed parents in two community samples. *Journal of Occupational Health Psychology, 1,* 57–69. http://dx.doi.org/10.1037/1076-8998.1.1.57
39. Marmot, M. G., Rose, G., Shipley, M., & Hamilton, P. J. (1978). Employment grade and coronary heart disease in British civil servants. *Journal of Epidemiology and Community Health, 32,* 244–249. http://dx.doi.org/10.1136/jech.32.4.244
40. Marmot, M. G., Bosma, H., Hemingway, H., Brunner, E., & Stansfeld, S. (1997, July 26). Contribution of job control and other risk factors to social variations in coronary heart disease incidence. *Lancet, 350,* 235–239. http://dx.doi.org/10.1016/S0140-6736(97)04244-X
41. Shields, M. (2006). Stress and depression in the employed population. *Health Reports, 17*(4), 11–29.
42. Tsutsumi, A., Kayaba, K., Kario, K., & Ishikawa, S. (2009, January 12). Prospective study on occupational stress and risk of stroke. *Archives of Internal Medicine, 169,* 56–61. http://dx.doi.org/10.1001/archinternmed.2008.503
43. Karasek, R. A., Jr. (1979). Job demands, job decision latitude, and mental strain: Implications for job redesign. *Administrative Science Quarterly, 24,* 285–308.
44. Broadhead, W., Kaplan, B., James, S., Wagner, E., Schoenbach,

V., Grimson, R., . . . Gehlbach, S. (1983). The epidemiological evidence for a relationship between social support and health. *American Journal of Epidemiology, 117,* 521–537.
45. Cohen, S., & Wills, T. A. (1985). Stress, social support, and the buffering hypothesis. *Psychological Bulletin, 98,* 310–357. http://dx.doi.org/10.1037/0033-2909.98.2.310
46. Robbins, J. M., Ford, M. T., & Tetrick, L. E. (2012). Perceived unfairness and employee health: A meta-analytic integration. *Journal of Applied Psychology, 97,* 235–272. http://dx.doi.org/10.1037/a0025408
47. Wilper, A. P., Woolhandler, S., Lasser, K. E., McCormick, D., Bor, D. H., & Himmelstein, D. U. (2009). Health insurance and mortality in US adults. *American Journal of Public Health*, *99,* 2289–2295. http://dx.doi.org/10.2105/AJPH.2008.157685
48. Eliason, M., & Storrie, D. (2009). Does job loss shorten life? *Journal of Human Resources, 44,* 277–302. http://dx.doi.org/10.3368/jhr.44.2.277
49. Strully, K. W. (2009). Job loss and health in the U.S. labor market. *Demography, 46,* 221–246. http://dx.doi.org/10.1353/dem.0.0050
50. Lee, S., Colditz, G. A., Berkman, L. F., & Kawachi, I. (2004). Prospective study of job insecurity and coronary heart disease in US women. *Annals of Epidemiology, 14,* 24–30. http://dx.doi.org/10.1016/S1047-2797(03)00074-7
51. Idler, E. L., & Benyamini, Y. (1997). Self-rated health and mortality: A review of twenty-seven community studies. *Journal of Health and Social Behavior, 38,* 21–37.
52. Miilunpalo, S., Vuori, I., Oja, P., Pasanen, M. & Urponen, H. (1997). Self-rated health status as a health measure: The predictive value of self-reported health status on the use of physician services and on mortality in the working-age population. *Journal of Clinical Epidemiology, 50,* 517–528. http://dx.doi.org/10.1016/S0895-4356(97)00045-0
53. McGee, D. L., Liao, Y., Cao, G., & Cooper, R. S. (1999). Self-reported health status and mortality in a multiethnic US cohort. *American Journal of Epidemiology, 149,* 41–46.
54. Grant, M. D., Piotrowski, Z. H., & Chappell, R. (1995). Self-reported health and survival in the Longitudinal Study of Aging, 1984–1986. *Journal of Clinical Epidemiology, 48,* 375–387. http://dx.doi.org/10.1016/0895-4356(94)00143-E
55. Mannino, D. M., Siegel, M., Rose, D., Nkuchia, J., & Etzel, R. (1997). Environmental tobacco smoke exposure in the home and worksite and health effects in adults: Results from the 1991 National Health Interview Survey. *Tobacco Control, 6,* 296–305. http://dx.doi.org/10.1136/tc.6.4.296
56. Hamer, M., Stamatakis, E., & Batty, G. D. (2010). Objectively assessed secondhand smoke exposure and mental health in adults: Cross-sectional and prospective evidence from the Scottish Health Survey. *Archives of General Psychiatry, 67,* 850–855. http://dx.doi.org/10.1001/archgenpsychiatry.2010.76
57. Law, M. R., Morris, J. K., & Wald, N. J. (1997, October 18). Environmental tobacco smoke exposure and ischaemic heart disease: An evaluation of the evidence. *British Medical Journal, 315,* 973–980. http://dx.doi.org/10.1136/bmj.315.7114.973
58. Hill, S., Blakely, T., Kawachi, I., & Woodward, A. (2004, April 22). Mortality among "never smokers" living with smokers: Two cohort studies, 1981–4 and 1996–9. *British Medical Journal, 328,* 988–989. http://dx.doi.org/10.1136/bmj.38070.503009
59. Wen, W., Shu, X. O., Gao, Y.-T., Yang, G., Li, Q., Li, H., & Zheng, W. (2006, August 17). Environmental tobacco smoke and mortality in Chinese women who have never smoked: Prospective cohort study. *British Medical Journal, 333,* 376–379. http://dx.doi.org/10.1136/bmj.38834.522894.2F
60. Iñiguez, S. D., Warren, B. L., Parise, E. M., Alcantara, L. F., Schuh, B., Maffeo, M. L., . . . Bolaños-Guzmán, C. A. (2009). Nicotine exposure during adolescence induces a depression-like state in adulthood. *Neuropsychopharmacology, 34,* 1609–1624. http://dx.doi.org/10.1038/npp.2008.220
61. U.S. Environmental Protection Agency. (1992). *Respiratory health effects of passive smoking: Lung cancer and other disorders* (Report EPA/600/6-90/006F). Washington, DC: Author.
62. LaMontagne, A. D., Keegel, T., Louie, A. M., Ostry, A., & Landsbergis, P. A. (2007). A systematic review of the job-stress intervention evaluation literature, 1990–2005. *International Journal of Occupational and Environmental Health, 13,* 268–280. http://dx.doi.org/10.1179/oeh.2007.13.3.268
63. Landsbergis, P. A. (2009). Interventions to reduce job stress and improve work organization and worker health. In P. L. Schnall, M. Dobson, & E. Rosskam (Eds.), *Unhealthy work: Causes, consequences, cures* (pp. 193–209). Amityville, NY: Baywood.
64. van Stolk, C., Staetsky, L., Hassan, E., & Kim, C. W. (2012). *Management of psychosocial risks at work: An analysis of the findings of the European Survey of Enterprises on New and Emerging Risks (ESENER).* Luxembourg, Grand Duchy of Luxembourg: Publications Office of the European Union.
65. Goh, J., Pfeffer, J., & Zenios, S.A. (2015). The relationship between workplace stressors and mortality and health costs in the United States. *Management Science*. Advance online publication. http://dx.doi.org/10.1287/mnsc.2014.2115
66. European Commission. (2011). *Report on the implementation of the European social partners' framework agreement on work-related stress* (SEC[2011] 241 Final). Brussels, Belgium: Author.
67. Crum, A. J., Salovey, P., & Achor, S. (2013). Rethinking stress: The role of mindsets in determining the stress response. *Journal of Personality and Social Psychology, 104,* 716–733. http://dx.doi.org/10.1037/a0031201
68. Siegrist, J. (1996). Adverse health effects of high-effort/low-reward conditions. *Journal of Occupational Health Psychology, 1,* 27–41. http://dx.doi.org/10.1037/1076-8998.1.1.27
69. Tsutsumi, A., & Kawakami, N. (2004). A review of empirical studies on the model of effort–reward imbalance at work: Reducing occupational stress by implementing a new theory. *Social Science & Medicine, 59,* 2335–2359. http://dx.doi.org/10.1016/j.socscimed.2004.03.030
70. Sinclair, U. (1906). *The jungle.* New York, NY: Doubleday.