

The Positive Effect of Resilience on Stress and Business Outcomes in Difficult Work Environments

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Objective: To examine whether resilience has a protective effect in difficult work environments. **Methods:** A survey of 2063 individuals measured individual resilience, stress, burnout, sleep problems, likelihood of depression, job satisfaction, intent to quit, absences, and productivity. It also measured work characteristics: job demands, job influence, and social support. Multivariate and logistic regression models examined the main effects and interactions of resilience and job characteristics. **Results:** High strain work environments (high demand, low influence, and low support) have an unfavorable effect on all outcomes. Resilience has a protective effect on all outcomes. For stress, burnout, and sleep, higher resilience has a more protective effect under low-strain conditions. For depression, absence and productivity, resilience has a more protective effect when job strain is high. **Conclusions:** Workers with high resilience have better outcomes in difficult work environments.

Employers are adopting resilience training for their employees at a rate faster than any other intervention in the United States.¹ Resilience—the ability to use positive mental skills to remain psychologically steady and focused when faced with challenges or adversity—contributes substantially to how workers deal with stress and perform at work.^{2,3} Employers are developing resilience to achieve a competitive advantage, similar to how the military trains active duty soldiers and their family members to withstand challenges.^{4,5}

Interest in the psychological construct of resilience has grown significantly over the past decade, from fewer than 30 peer-reviewed studies per year before 2000, to over 650 in 2014.⁶ In the past, resilience has been defined as “the ability of an individual to recover from a traumatic event or to remain psychologically robust when faced with an adverse event”⁷ and “the process of negotiation, management, and adaptation to significant sources of stress or trauma.”⁸ In other words, it reflects an individual’s ability to respond well and experience fewer harmful

consequences when under duress. More recently, however, studies have examined how resilience influences responses to more common life challenges such as health events and work stress.^{2,9}

Broadly defined as the ability to “bounce back” from adversity,⁸ there is evidence attributes of resilience—such as emotion regulation, impulse control, causal analysis, self-efficacy, and realistic optimism—can be learned and developed.² In this framework, resilience extends beyond one’s inherent predisposition toward life events and includes a set of acquired skills that mitigate the experience of stress and speed productive responses when setbacks occur.

As interest in employee resilience increases, employers may question whether individual resilience simply reflects the settings and environments in which employees work. It is plausible that employees feeling appreciated and supported at work report higher resilience, while those feeling unsupported in demanding jobs report lower resilience. Further, employers may question whether resilience can counteract the negative effects of a difficult or stressful work environment.

These are important questions because stressful work environments are a known health risk, with documented negative physical and mental health consequences. Job strain—combinations of high job demands, low decision latitude, and low social support—have been linked to stress,¹⁰ cardiovascular disease,^{11–13} and diabetes,¹⁴ as well as rates of absence,¹⁵ disability,¹⁶ and turnover.^{17,18} Beyond producing general mental distress,¹⁹ there is also evidence suggesting that stressful work environments increase the likelihood of developing depression or anxiety for the first time.²⁰ Further, recent findings point to difficult work environments as a contributing factor in the premature death of workers.²¹

There is some evidence that resilience has a moderating effect on the negative relationship between job strain and job satisfaction.²² This suggests that workers’ learned ability to be resilient could have protective effects in demanding work settings. More broadly, employers require a better understanding of how resilience scores relate to important health and work outcomes, such as perceived stress, depression, job satisfaction, intent to quit, absenteeism, and self-reported job performance. It is also important to differentiate individual resilience from elements of the work environment, such as social support, job demands, and individual discretion. This cross-sectional study examines the question of whether having greater levels of resilience mitigates the negative effects of stressful work environments.

METHODS

Sample

A convenience sample of 2063 respondents from the web-survey service survey sampling international (SSI) completed the survey online in spring 2015. Respondents were part of SSI’s existing survey panel. Eligibility criteria included being 18 to 64 years of age and currently employed. Multiple lie-scale items (such as “I have read all the works of William Shakespeare” and “I can jump higher than a skyscraper”) were imbedded in the survey, to which incorrect answers resulted in respondents being prevented from completing the survey and excluded from the sample. Approximately, three partial respondents were dropped for every

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respondent who completed the survey and answered the lie-scale questions correctly. Final data included information about each respondent's age and sex.

MEASURES

Resilience

Resilience was measured using a 16-item scale, consisting of four subscales of four items each. Items were scored on a Likert scale on degree of agreement, ranging in value from 1 to 5. Overall resilience was measured as the average score across the 16 items; scale scores indicated the average score for items in that scale. Labels and internal consistency reliability for each of the subscales were as follows: problem solving ($\alpha = 0.82$), emotion control ($\alpha = 0.86$), optimism ($\alpha = 0.88$), and self-efficacy ($\alpha = 0.81$). (Sample items from each scale are included in the Appendix, Supplemental Digital Content 1, <http://links.lww.com/JOM/A313>) Inter-correlations among the subscales ranged from 0.66 to 0.80. When combined into the overall meQuilibrium Resilience Scale, it had internal consistency reliability of $\alpha = 0.94$. This Resilience Scale correlated positively (0.71) with psychological capital,²³ a closely-related construct, and negatively (-0.50) with the Perceived Stress Scale. The resulting scale is proprietary to meQuilibrium.

Work Environment

Work environment was assessed using segments of the Copenhagen Psychosocial Questionnaire (CPQ),^{24,25} specifically combined job demands, job influence (similar to job control), and social support. All scoring was performed according to instructions from CPQ,²⁴ which assigns a value of 0 to 100. Job demands were the average item score across three subscales: quantitative demands (example: how often do you not have time to complete all your work tasks?), cognitive demands (example: does your work require you to make difficult decisions?), and emotional demands (example: does your work put you in emotionally disturbing situations?). Influence was measured using the average item score on the influence subscale (examples: do you have a large degree of influence concerning your work? Do you have a say in choosing who you work with?). Social support was measured using the average scores on the social-support-from-colleagues and social-support-from-supervisors subscales (examples: how often do you get help and support from your colleagues? How often is your nearest superior willing to listen to your problems at work?).

Independent effects of demands, influence, and support each on health and work outcomes were assessed. Additionally, consistent with previous studies, combined effects were also tested. Because the additive effects of high demands, low influence, and low support (indicated as HD, LI, LS) have been shown to have harmful consequences,^{11,16,26} this combination (where demands, influence, and social support were divided at the median) was selected as the most difficult work environment. As a comparison, the respondents having low demands (below median), high influence (above median), and high support (above median) (LD, HI, HS) were selected as having the least difficult work environment.

Work Outcomes

The outcomes of interest included four stress-related outcomes (self-reported stress, burnout, depression, and sleep problems) and four job-related outcomes (job satisfaction, intent to quit, reported absences, and productivity loss).

Stress was indicated by responses to the Perceived Stress Scale.^{27,28} Burnout and sleep problems were measured using the CPQ subscales for those issues. Likelihood of depression was assessed using a cut-off of 10 points on the Patient Health Questionnaire-9 (PHQ-9).²⁹ Job satisfaction was measured with the question: how satisfied are you with your job? (On a scale of 1 to 10,

“extremely dissatisfied” to “extremely satisfied”). Intent to quit was measured with the question: how likely are you to quit your job in the next 6 months? (Those answering a 9 or 10 were classified as likely to quit). Absences were measured using the question: other than vacation days or holidays, how many days of work did you miss last month? (Coded as “any” or “none”). Diminished productivity was measured according to the degree of reported impairment using the question: during the past 7 days, how much did problems with your health affect your productivity *while you were working*? (Where 1 was “not at all” and 10 was “completely prevented from working”). This item was scored by multiplying the number by 10 to get a percent of time impaired, referred to as lost productivity.

ANALYSIS

Regression models were run in sequential steps. First, each work outcome was predicted, using age, sex, demand, influence, and social support. Next, the resilience measure was added to the model. Lastly, interactions among the work environment measures and with the resilience scale were added to the model. For the outcomes of “likelihood of depression,” “any reported absence,” and “intent to quit,” logistic regression models were applied.

Once models were completed, coefficients were used to produce estimated outcomes under specific scenarios while holding age and sex constant. Four scenarios were estimated: two levels of work environment and two levels of resilience. High-strain work environments (HD, LI, LS) versus low-strain environments (LD, HI, HS) were projected using the 25th and 75th percentiles. Specifically, high-strain environments were set at the 75th percentile (score of 52) on the demand scale and the 25th percentiles of both influence (score of 44) and social support (score of 53). Conversely, low-strain environments were set at the 25th percentile of demand (score of 25) and the 75th percentile of both influence (score of 69) and social support (score of 78). In order to estimate the effects of high and low resilience, specific levels of resilience were set in the model for high resilience (four out of five) versus low resilience (two out of five). Control variables were held at 50% men, and 40 years of age. All statistical analysis was performed using Stata Statistical Software (Version 14.1, StataCorp, College Station, Texas).

RESULTS

Summary characteristics and scores are shown in Table 1. The average score for stress was 16 (standard deviation [s.d.] = 7), which is higher than the average reported by Cohen in a representative, national sample.³⁰ Average burnout was 43 (s.d. = 27) and sleep problems was 38 (s.d. = 27). These scores are somewhat lower than the large population of health-industry volunteers on which the

TABLE 1. Summary Characteristics

	Mean	Standard Deviation
Age	43	12
Gender (male)	40%	49%
Stress	16	7
Job satisfaction	6.6	2.7
Burnout	43	27
Intent to quit (binomial)	30%	45%
Depression risk (binomial)	20%	41%
Sleep problems	38	27
Any absence (binomial)	28%	45%
Productivity loss	18%	25%
Work environment scores		
Work demands	39	19
Job Influence	57	17
Social support	65	15
Resilience	3.3	0.8

CPQ was validated.²⁴ Average reported loss of productivity was 1.8 on a scale of 0 to 10 (converted to an 18% impairment from a possible 100%), slightly higher than reported in the validation of this instrument.³¹ According to the PHQ-9 algorithm, 20% of respondents were at risk of either moderate or severe depression. According to Gallup, 10.8% of full-time workers have diagnosed depression and 16.6% of part-time workers have depression,³² although those in the current study may have been undiagnosed.

Reported work environment scores averaged 39 (s.d. = 19) for work demands, 57 (s.d. = 17) for job influence, and 65 (s.d. = 15) for social support. These means represent a less stressful work environment than the population on which the CPQ was validated.²⁴ Splitting scores for all three work environment domains at the median, the percent of respondents rating the characteristics of their work environment are shown in Table 2. More respondents (23%) fell in the high demand—high influence—high support (HD, HI, HS) category than any other. The next most common category (18%) was LD, LI, LS. Fewest fell in the LD, HI, LS (5%) and HD, LI, HS (7%).

Main Effects

The control variables, age and sex, were significant in most models, whereby being male and older had a favorable association. Only for health-related productivity did age have a negative association.

Resilience was favorably associated with all outcomes ($P < 0.01$). In all instances, individuals with higher resilience scores were predicted to have more favorable outcomes regardless of work environment (as shown along the Y-axis of Fig. 1A–H). Outcomes differed significantly comparing low to high resilience and were most notable for depression (mean difference of 27%), absence (mean difference 12%), and productivity (mean difference of 14.3%). The effect was least for job satisfaction (mean difference less than one point on a 1 to 10 point scale), although still significant.

Individual work environment variables were associated with all outcomes (see Table 3). To aid interpretation, favorable relationships (for example, lower stress or higher satisfaction) are shown with (+) symbols, while unfavorable effects (for example, higher turnover or lower job satisfaction) are shown as (–) symbols. Work demands had unfavorable associations with all variables ($P < 0.01$). Social support had unfavorable associations with all outcomes ($P < 0.01$) except sleep troubles and absence. Job influence had significant and favorable associations with stress, job satisfaction, intent to quit, productivity (all $P < 0.01$), and burnout ($P < 0.05$).

The expected difference in outcomes when work environment variables were combined into high- and low-strain combinations can be seen along the X axis in Fig. 1A through Fig. 1H. In all instances, high-strain environments corresponded to less favorable outcomes. Working in a high-strain environment had the strongest (unfavorable) impact on burnout, job satisfaction, and sleep problems.

Interactions

Because for some outcomes higher values are better (job satisfaction), while for others higher values are worse (intent to

quit), significance of interaction terms is shown with a (*) symbol in Table 3, rather than showing positive or negative direction. However, the nature and direction of each relationship is described here.

Work demands had a significant interaction with job influence (one’s discretion over job tasks) for four outcomes (depression, intent to quit, absence, and productivity loss). In all cases, the interaction indicated a larger difference in outcome between high and low demands when influence was high compared with the difference when influence was low.

Demands interacted significantly with social support for three outcomes (perceived stress, burnout, and job satisfaction). In all cases, the interaction indicated a larger difference in outcomes between high and low demands when social support was low compared with the difference when social support was high. In other words, the negative effects of a demanding job were magnified when social support was low.

Social support and influence interacted significantly for three outcomes (perceived stress, depression, and job satisfaction). In all cases, the interaction indicated that expected differences between high and low influence were larger when social support was high than when it was low. When employees felt supported, the benefits of having discretion over job tasks were enhanced.

Resilience interacted significantly with social support for six outcomes (all except intent to quit and absence); however, the direction of interaction was not the same in all cases. For four outcomes (stress, burnout, sleep troubles, and job satisfaction), having higher resilience was associated with more pronounced positive outcomes when social support was also high. For productivity and depression, the reverse was true; in cases where social support was low, the difference between high and low resilience was greater. In other words, having higher resilience was especially protective against depression and lost productivity when faced with environments with low social support.

Resilience interacted significantly with work demands for two outcomes (burnout and sleep problems). Burnout and sleep problems were higher in high-demand conditions, but the difference between high and low resilience was greater under high-demand conditions than lower-demand conditions. Resilience interacted significantly with influence for one outcome (intent to quit), where the highest intent to quit would be expected in those perceiving both low influence and low resilience. Again, these interactions are in the direction where the effects of resilience are more pronounced in more difficult work conditions.

To best summarize the overall interactions between work environment and resilience for all outcomes, coefficients from respective models were used to compare outcomes for high and low resilience under high strain (high demand, low influence, and low support) and low strain (low demand, high influence, and high support) conditions. Results are displayed in Fig. 1A through Fig. 1H.

As shown, interaction effects varied across outcomes. For stress, burnout, and sleep problems, the effect of better resilience was greater for those in low-strain job situations. However, for depression, absence, and productivity, the effect of better resilience was greater under high-strain conditions.

TABLE 2. Reported Work Environment Characteristics

	Demand	High		Low	
	Influence	High	Low	High	Low
Support	High	23%	7%	15%	9%
	Low	12%	12%	5%	18%

Percents may exceed 100% due to rounding.

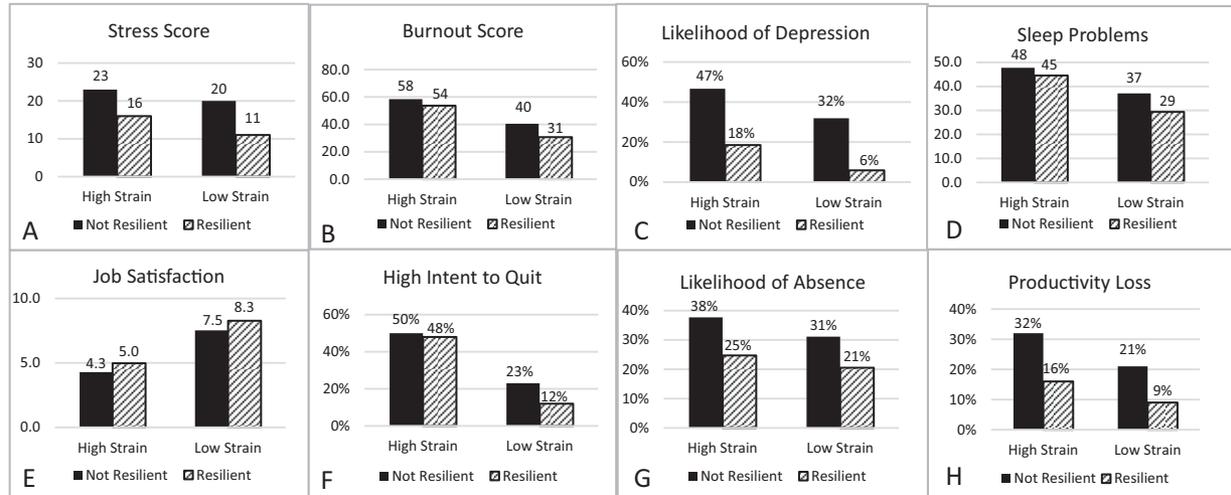


FIGURE 1. Outcomes comparing high and low resilience under high and low strain work environments.

Four three-way interactions (between resilience and each of the three work environment factors) and one four-way interaction were tested in all eight outcomes. Only one of these 32 terms was significant, the interaction between resilience, work demands, and job support in predicting perceived stress. This effect showed that the difference in perceived stress between those having high versus low resilience was greater under high-support conditions than low support conditions, but that those differences between high and low support were slightly larger when demands were low than when demands were high. However, because only one three-way effect was significant,

three-way and four-way interaction terms were not included in the final estimation models.

DISCUSSION

Consistent with other research findings,^{3,33,34} psychological resilience has an independent, favorable association with all eight work outcomes in this study. Plus, uniformly across all outcomes, the favorable effect of resilience remained significant regardless of work environment scenarios. As seen in Fig. 1A–H, individuals with lower resilience reported worse psychological and work outcomes, across both high-strain and low-strain work environments.

TABLE 3. Outcomes

	Outcome							
	Stress	Burnout [†]	Depression	Sleep Problems	Job Satisfaction [‡]	Intent to Quit [§]	Absence	Productivity
Model 1								
Age	+++		+++		+++	+++	+++	—
Gender (male)	+++	+++	+++	+++			+++	
Demand	—	—	—	—	—	—	—	—
Influence	+++	++			+++	+++		+++
Social support	+++	+++	+++		+++	+++		+++
Model 2								
Add Resilience	+++	+++	+++	+++	+++	+++	+++	+++
Model 3								
Add Demand*Influence			**			**	***	***
Demand*Support	**	***			***			
Support*Influence	**		**		***			
Demand*Resilience		**		***				
Influence*Resilience						***		
Support*Resilience	***	**	***	***	***			**

[†]Influence main effect becomes significant after interactions are added.
[‡]Support main effect becomes not significant with interactions.
[§]Demand, Influence, resilience main effects become not significant when interactions added.
^{||}Influence becomes not significant when interactions are added.
 +++(P < 0.01 favorable main effect).
 —(P < 0.01 unfavorable main effect).
 ***(P < 0.01 interaction).
 ++(P < 0.05 favorable main effect).
 —(P < 0.05 unfavorable main effect).
 **(P < 0.05 interaction).

The most notable effects of resilience are the 10% to 20% lower rates in likely depression, absence, and productivity loss when resilience is high.

Similar to findings documented elsewhere,^{17,22,35} in this study difficult work environments were associated with higher stress, lower job satisfaction, burnout, stress-symptoms such as difficulty sleeping, and increased likelihood of depression. Further, difficult work environments were associated with increased reported absence, intent to quit, and lower productivity. These results show high demands had the most consistent, harmful effect on psychological and work outcomes, with low social support having the next more consistent, unfavorable effect.

Thus, the main questions addressed in this investigation have clear answers. First, resilience is an independent predictor of stress and work outcomes and this association persists while controlling for age, sex, and work setting. Second, stress and associated work outcomes are worsened in difficult work environments. As a rule, employees with higher resilience will feel and perform better, regardless of work environment. And, employees in difficult work environments will, on average, feel and perform worse regardless of resilience. This is consistent with previous studies where certain combinations of work characteristics are more toxic to health than others, namely the combination of high demand with low influence and low social support—called high job strain.^{11,17,36,37}

Relationships among work environment characteristics and resilience are complex, as indicated by the number and variety of significant interaction terms. All models except one had at least one significant interaction among work environment characteristics. Another signal of complexity is demonstrated by every model including at least one significant interaction term between resilience and one of the work environment characteristics, most often support and demands.

Interpretation of the observed relationships is made more challenging because the direction of interaction varied across work outcomes. For example, the interaction between social support and resilience was significant across most outcomes. In some instances—perceived stress, burnout, sleep problems, and job satisfaction—resilience and social support were synergistic. In those cases, the positive, favorable *impact of resilience was greater when social support was high* than when social support was low. This implies that being surrounded by a supportive work community magnifies higher resilience. However, the reverse effect was noted for productivity and likelihood of depression. In those cases, *resilience was most protective when a worker had an unsupportive environment*.

The combined effects of these interactions can perhaps be best understood by noting differences in slopes shown in Fig. 1A–H. As a simplified summary, high resilience had a relatively consistent protective effect against stress, job dissatisfaction, and depression, regardless of work environment. While significant in either work environment, high resilience appeared to have a magnifying effect on burnout, sleep problems, and intent to quit in better work environments. In contrast, resilience appears to have a stronger protective effect on the two outcomes most directly related to work performance—absence and lost productivity—under the most difficult work conditions.

This contradiction may suggest that in difficult job settings, resilient employees (who have lower burnout and desire to quit overall) experience a more dramatic increase in these feelings, but are able to maintain their effort and performance to accomplish the job. Employees with low resilience continue to feel their already high levels of burnout and desire to quit while allowing their performance to suffer.

Limitations

Convenience samples from web panels, regardless of the reputation of the panel provider, often prompt questions about the

quality of responses. This population reported levels of stress and work characteristics within a half a standard deviation of other studies,^{38,39} however, it is possible that they had unique or uncommon work circumstances. Other than being employed, job types were not identified. Thus, it is not possible to discern whether these findings are specific to certain types of jobs or work settings.

Self-reported outcomes also warrant caution when generalizing findings to actual absenteeism, turnover, and productivity. Evidence suggests that self-reported outcomes of this type are ordinarily correct, meaning that the direction of effects is likely to be correct, but that the magnitude may not be.^{40,41}

SUMMARY

Higher levels of resilience were found to have beneficial effects on worker's perceptions of stress, psychological responses to stress, and job-related behaviors related to stress regardless of difficult environments. Faced with especially difficult work environments, workers with higher levels of resilience seem able to avoid absences and be more productive than workers with low resilience.

REFERENCES

- Livingston S. *Employers turn to resilience-building programs to cut worker stress*. *Business Insurance Holdings*; June 7, 2015, Available at: <http://www.businessinsurance.com/article/20150607/NEWS03/306079981/employers-turn-to-resilience-building-programs-to-cut-worker-stress>. Accessed November 4, 2015.
- Shatté AJ. Resilience in work and in life. In: Pulla V, Shatté A, Warren S, editors. *Perspectives on Coping, Resilience*. New Delhi: Authors Press Books; 2012. pp. 444–479.
- Kwok ST, Wong WN, Lee TY. Effect of resilience on self-perceived stress and experiences on stress symptoms. A surveillance report. *Univ J Public Health*. 2014;2:64–72.
- Meadows SQ, Miller LL, Robson S. Airman and family resilience: lessons from the scientific literature. *RAND Project Air Force Series on Resiliency*. 2015; www.rand.org/t/RR106. Accessed September 26, 2016.
- Meredith LS, Sherbourne CD, Gaillot S, et al. Promoting Psychological Resilience in the U.S. Military; 2011. www.rand.org/content/dam/rand/pubs/.../RAND_MG996.sum.pdf. Accessed September 26, 2016.
- PubMed [database online]. Search terms "psychological resilience". 2015. Available at: <http://www.ncbi.nlm.nih.gov/pubmed/>. Accessed November 4, 2015.
- de Terte I, Stephens C, Huddleston L. The development of a three part model of psychological resilience. *Stress Health*. 2014;30:416–424.
- Windle G. What is resilience? A review and concept analysis. *Rev Clin Gerontol*. 2011;21:152–169.
- Youssef C, Luthans F. Positive organizational behavior in the workplace: the impact of hope, optimism, and resilience. *J Manag*. 2007;33:774–800.
- Karasek R, Theorell T, editors. *Healthy Work: Stress, Productivity, and the Reconstruction of Working Life*. New York: Basic Books, Inc; 1990.
- Johnson JV, Hall EM. Job strain, work place social support, and cardiovascular disease: a cross-sectional study of a random sample of the Swedish working population. *Am J Public Health*. 1988;78:1336–1342.
- Karasek R, Baker D, Marxer F, Ahlbom A, Theorell T. Job decision latitude, job demands, and cardiovascular disease: a prospective study of Swedish men. *Am J Public Health*. 1981;71:694–705.
- Landsbergis PA, Schnall PL, Pickering TG, Warren K, Schwartz JE. Life-course exposure to job strain and ambulatory blood pressure in men. *Am J Epidemiol*. 2003;157:998–1006.
- Huth C, Thorand B, Baumert J, et al. Job strain as a risk factor for the onset of type 2 diabetes mellitus: findings from the MONICA/KORA Augsburg cohort study. *Psychosom Med*. 2014;76:562–568.
- Hemingway H, Shipley MJ, Stansfeld S, Marmot M. Sickness absence from back pain, psychosocial work characteristics and employment grade among office workers. *Scand J Work Environ Health*. 1997;23:121–129.
- Canivet C, Choi B, Karasek R, Moghaddassi M, Staland-Nyman C, Stergren P-OO. Can high psychological job demands, low decision latitude, and high job strain predict disability pensions? A 12-year follow-up of middle-aged Swedish workers. *Int Arch Occup Environ Health*. 2013;86:307–319.
- Chiu YL, Chung RG, Wu CS, Ho CH. The effects of job demands, control, and social support on hospital clinical nurses' intention to turn over. *Appl Nurs Res*. 2009;22:258–263.

18. Coomber B, Barriball KL. Impact of job satisfaction components on intent to leave and turnover for hospital-based nurses: a review of the research literature. *Int J Nurs Stud*. 2007;44:297–314.
19. Vaananen A, Toppinen-Tanner S, Kalimo R, Mutanen P, Vahtera J, Peiro JM. Job characteristics, physical and psychological symptoms, and social support as antecedents of sickness absence among men and women in the private industrial sector. *Soc Sci Med*. 2003;57:807–824.
20. Melchior M, Caspi A, Milne BJ, Danese A, Poulton R, Moffitt TE. Work stress precipitates depression and anxiety in young, working women and men. *Psychol Med*. 2007;37:1119–1129.
21. Goh J, Pfeffer J, Zenios S. Exposure to harmful workplace practices could account for inequality in life spans across different demographic groups. *Health Aff (Millwood)*. 2015;34:1761–1768.
22. Earvolino Ramirez ML. *Relationships Between Job Strain, Body Mass Index, Background Information Variables, and Resilience as Predictors of Job Satisfaction Among Hospital Staff Nurses*. Nursing School, University of Texas at Austin; 2009.
23. Luthans F, Avolio BJ, Avey JB, Norman SM. *Positive Psychological Capital: Measurement and Relationship with Performance and Satisfaction*. Leadership Institute Faculty Publications; 2007, Paper 11:541-572.
24. Pejtersen JH, Kristensen TS, Borg V, Bjorner JB. The second version of the Copenhagen psychosocial questionnaire. *Scand J Public Health*. 2010;38(Suppl 3):8–24.
25. Thorsen SV, Bjorner JB. Reliability of the Copenhagen psychosocial questionnaire. *Scand J Public Health*. 2010;38(Suppl 3):25–32.
26. Amick BC 3rd, McDonough P, Chang H, Rogers WH, Pieper CF, Duncan G. Relationship between all-cause mortality and cumulative working life course psychosocial and physical exposures in the united states labor market from 1968 to 1992. *Psychosom Med*. 2002;64:370–381.
27. Taylor JM. Psychometric analysis of the ten-item perceived stress scale. *Psychol Assess*. 2014;27:90–101.
28. Ingram PB 4th, Clarke E, Lichtenberg JW. Confirmatory factor analysis of the perceived stress scale-4 in a community sample. *Stress Health*. 2016;32:173–176.
29. Kroenke K, Spitzer RL, Williams JBW. The PHQ-9. *J Gen Int Med*. 2001;16:606–613.
30. Cohen S, Williamson G. Perceived stress in a probability sample of the U.S. In: Spacapan S, Oskamp S, editors. *The Social Psychology of Health: Claremont Symposium on Applied Social Psychology*. Newbury Park, CA: Sage; 1988. pp. 31–67.
31. Reilly MC, Zbrozek AS, Dukes EM. The validity and reproducibility of a work productivity and activity impairment instrument. *Pharmacoeconomics*. 1993;4:353–365.
32. Witters D, Liu D, Agrawal S. Depression Costs U.S. Workplaces \$23 Billion in Absenteeism. 2013. Available at: <http://www.gallup.com/poll/163619/depression-costs-workplaces-billion-absenteeism.aspx>. Accessed June 28, 2016.
33. Bauer H, Emeny RT, Baumert J, Ladwig KH. Resilience moderates the association between chronic pain and depressive symptoms in the elderly. *Eur J Pain*. 2016;20:1253–1265.
34. Alschuler KN, Kratz AL, Ehde DM. Resilience and vulnerability in individuals with chronic pain and physical disability. *Rehabil Psychol*. 2016;61:7–18.
35. Burr H, Albertsen K, Rugulies R, Hannerz H. Do dimensions from the Copenhagen Psychosocial Questionnaire predict vitality and mental health over and above the job strain and effort-reward imbalance models? *Scand J Public Health*. 2010;38(3 Suppl):59–68.
36. Canivet C, Choi B, Karasek R, Moghaddassi M, Staland-Nyman C, Ostergren PO. Can high psychological job demands, low decision latitude, and high job strain predict disability pensions? A 12-year follow-up of middle-aged Swedish workers. *Int Arch Occup Environ Health*. 2013;86:307–319.
37. Sacker A, Bartley MJ, Frith D, Fitzpatrick RM, Marmot MG. The relationship between job strain and coronary heart disease: evidence from an english sample of the working male population. *Psychol Med*. 2001;31:279–290.
38. Cohen S, Janicki-Deverts D. Who's Stressed? Distributions of psychological stress in the United States in Probability Samples from 1983, 2006, and 2009. *J Appl Soc Psychol*. 2012;42:1320–1334.
39. Clausen T, Burr H, Borg V. Does affective organizational commitment and experience of meaning at work predict long-term sickness absence? An analysis of register-based outcomes using pooled data on 61,302 observations in four occupational groups. *J Occup Environ Med*. 2014;56:129–135.
40. Lerner D, Amick BC, Lee JC, et al. Relationship of employee-reported work limitations to work productivity. *Med Care*. 2003;41:649–659.
41. Johns G, Miraglia M. The reliability, validity, and accuracy of self-reported absenteeism from work: a meta-analysis. *J Occup Health Psychol*. 2015;20:1–14.