

Workplace Stress and Productivity: A Cross-Sectional Study

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ABSTRACT

Introduction. The primary purpose of this study was to evaluate the association between workplace stress and productivity among employees from worksites participating in a WorkWell KS Well-Being workshop and assess any differences by sex and race.

Methods. A multi-site, cross-sectional study was conducted to survey employees across four worksites participating in a WorkWell KS Well Being workshop to assess levels of stress and productivity. Stress was measured by the Perceived Stress Scale (PSS) and productivity was measured by the Health and Work Questionnaire (HWQ). Pearson correlations were conducted to measure the association between stress and productivity scores. T-tests evaluated differences in scores by sex and race.

Results. Of the 186 participants who completed the survey, most reported being white (94%), female (85%), married (80%), and having a college degree (74%). A significant inverse relationship was observed between the scores for PSS and HWQ, $r = -0.35$, $p < 0.001$; as stress increased, productivity appeared to decrease. Another notable inverse relationship was PSS with Work Satisfaction subscale, $r = -0.61$, $p < 0.001$. One difference was observed by sex; males scored significantly higher on the HWQ Supervisor Relations subscale compared with females, 8.4 (SD 2.1) vs. 6.9 (SD 2.7), respectively, $p = 0.005$.

Conclusions. Scores from PSS and the HWQ appeared to be inversely correlated; higher stress scores were associated significantly with lower productivity scores. This negative association was observed for all HWQ subscales, but was especially strong for work satisfaction. This study also suggested that males may have better supervisor relations compared with females, although no differences between sexes were observed by perceived levels of stress.

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INTRODUCTION

Psychological well-being, which is influenced by stressors in the workplace, has been identified as the biggest predictor of self-assessed employee productivity.¹ The relationship between stress and productivity suggests that greater stress correlates with less employee productivity.^{1,2} However, few studies have examined productivity at a worksite in relation to stress.

Previous research focused on burnout, job satisfaction, or psychosocial factors and their association with productivity;³⁻⁷ all highlight the importance of examining overall stress on productivity. Other studies focused on self-perceived stress and employer-evaluated job performance instead of self-assessed productivity.⁸ However, most studies

examining this relationship have been occupation specific.^{8,9} Larger studies examining this relationship were performed in other countries.^{1,5,9,10}

The purpose of this study was twofold. First, the study sought to elucidate the relationship between stress and productivity in four worksites in Kansas. Second, the study sought to examine potential differences in stress and productivity by sex and race.

METHODS

Recruitment and Sampling Procedures. The target population was employees from four WorkWell KS worksites. WorkWell KS is a statewide worksite initiative in Kansas that provides leadership and resources for businesses and organizations to support worksite health. Because access to employee emails was unavailable, a URL link to an online survey was sent to the worksite contact, who was responsible for ensuring the distribution of the URL link to a cross-section of employees at the worksite. Following a WorkWell KS workshop (held in Topeka, Kansas on November 6, 2017) attendees from the four worksites were recruited to distribute a link to an online survey to their employees. Workshop attendees were members of wellness committees or were worksite representatives. Employee responses to the online survey were collected through mid-December 2017. No compensation was given for disseminating the survey link or for participating in the study. This study was approved by the University of Kansas School of Medicine-Wichita's Human Subjects Committee.

Online Survey. The online survey comprised demographic items with two instruments, the Perceived Stress Scale (PSS),¹¹ and the Health and Work Questionnaire (HWQ).¹² Demographic items included employee, sex, race, age, marital status, and highest level of education completed.

Perceived Stress Scale. Stress was measured by the PSS, a 10-item questionnaire designed for use in community samples. The purpose of the instrument is to assess global perceived stress during the past month. Each item is measured with a Likert-type scale (0 = Never, 1 = Almost Never, 2 = Sometimes, 3 = Fairly Often, 4 = Very Often). This scale is reversed on four positively stated questions. Scoring of the PSS is obtained by summing all responses. Results range from zero to 40, with higher PSS scores indicating elevated stress: scores of 0 - 13 are considered low stress, 14 - 26 moderate stress, and 27 - 40 are high perceived stress. The results for perceived stress were used by this study as an indication of psychological well-being.

Health and Work Questionnaire. The HWQ is a 24-item instrument that measures multidimensional worksite productivity. Productivity is assessed by asking respondents how they would describe their efficiency, overall quality of work, or overall amount of work in one week. All items are scaled with Likert-type response anchors, each ranging from 1 to 10 points. Most are positively worded items with response scales from least (scored as a 1) to most favorable

(scored as a 10). Exceptions are items 1 and 16 through 24, which are negatively worded and reversed scored. Items are divided into six sub-scales: productivity, concentration/focus, supervisor relations, non-work satisfaction, work satisfaction, and impatience/irritability. As part of the HWQ, employees assessed productivity two ways: on themselves and how their supervisor or co-workers might perceive it. Accordingly, productivity is stratified into a self-assessed sub-score and perceived other-assessed sub-score. HWQ scores are tallied and averaged for each sub-scale, with higher scores generally indicating greater productivity.

The Consent Process. Representatives who participated in the WorkWell KS workshop sent an e-mail to their employees with a request to click on the link and complete the online survey. The link opened the electronic consent, which was the opening remark, followed by the two assessment instruments and the demographic items. Consent was implied by participation in the survey. To encourage survey participation, representatives also sent employees a few e-mail reminders at their own discretion.

Statistical Analysis. The statistical analysis included descriptive statistics, measures of association, and comparisons of survey responses by sex and race. Descriptive statistics comprised response summaries; means and standard deviations were used for continuous variables, while frequency and percentages were used for categorical responses. The relationship between stress and productivity measures were assessed using Pearson correlations. Sex and race comparisons for PSS and HWQ subscales were evaluated using two-sided t-tests; alpha was set at 0.05 as the level of significance. Study participants with missing values were excluded pairwise from the analysis.

Response Rates. Four of nine worksites participated in the study, including two health departments (89 participants), one school district (76 participants), and one non-profit for the medically underserved (21 participants). A total of 188 employees opened the survey link, 186 employees answered the first question of the survey, and 174 employees completed the survey items. The 12 study participants with missing values were excluded from the pairwise analysis. The response rate, defined as those participants who completed the survey, was 58.6% (n = 174). To protect the confidentiality of respondents, data were aggregated and no other comparisons were made by location.

RESULTS

Participants who completed the survey included 174 employees from four worksites in Kansas. Of those who responded, 94% (155 out of 165) reported being white, 85% (142 of 167) reported being female, 81% (124 of 153) reported being between 30 and 59 years, and 60% (99 of 166) reported having a bachelor's degree or higher (Table 1).

With regard to measures of stress, the mean PSS was 16.4, with a standard deviation of 6.2, suggesting that employees have moder-

ate levels of stress at these locations. This result was consistent with the HWQ question regarding "overall stress felt this week", with a mean score of 4.7 (SD 2.5; 10 is "very stressed"). Regarding measures of productivity, the mean overall HWQ was 6.3 (SD 0.7). With the exception of reverse items, as noted below, scores of 10 indicated high levels of productivity. Mean scores by scale were: 7.3 (SD 1.0) for overall productivity, with 7.5 (SD 1.3) for own assessment, and 7.5 (SD 1.2) for perceived other's assessment; 7.1 (SD 2.7) supervisor relations, 7.8 (SD 1.8) for non-work satisfaction, and 7.3 (SD 1.7) for work satisfaction. The mean scale for the reverse items scores were concentration/focus at 3.4 (SD 2.0), and impatience/irritability 3.2 (SD 1.6).

Table 1. Participant demographics.

Characteristics	Missing		Total	
	N = 186	100%	n	%
Male	19	0.10	25	15.0
Female			142	85.0
White	21	0.11	155	93.9
Minority			10	6.1
Age group	33	0.18		
20 - 29			15	9.8
30 - 39			30	19.6
40 - 49			41	26.8
50 - 59			53	34.6
60 - 69			12	7.8
70+			2	1.3
Married	17	0.09	136	80.5
Unmarried			33	19.5
Highest level of education completed	20	0.11		
High school graduate or GED			12	7.2
Some college, no degree			32	19.3
Associate degree			23	13.9
Bachelor degree			65	39.2
Graduate or professional degree			34	20.5

Correlations between the PSS and the HWQ subscales ranged from -0.61 to 0.55 (Table 2). A negative association was observed between the PSS and the overall HWQ, $r(177) = -0.35, p < 0.001$. While each of the positively-coded HWQ subscales was associated negatively with the PSS, the strongest correlation occurred between work satisfaction and PSS, $r(177) = -0.61, p < 0.001$, suggesting that as stress increases work satisfaction declines.

In evaluating differences by sex, mean scores were significantly higher for males compared with females for the HWQ Supervisor Relations subscale (8.4 (SD 2.1) versus 6.9 (SD 2.7), respectively; $p < 0.005$; Table 3). No other sex differences were observed for either instrument. Similarly, there were no significant differences by race.

Table 2. Measures of correlation within and between the PSS and HWQ.

Description	Total HWQ	Productivity			Concentration/ focus*	Supervisor relations	Non-work satisfaction	Work satisfaction	Impatience/ irritability*
		Overall	Own assessment	Other's assessment					
Overall productivity	0.76	--							
- own assessment	0.60	0.89	--						
- other's assessment	0.77	0.94	0.75	--					
Concentration/ focus*	-0.02	-0.40	-0.49	-0.37	--				
Supervisor relations	0.52	0.30	0.17	0.38	-0.25	--			
Non-work satisfaction	0.47	0.35	0.35	0.38	-0.34	0.14	--		
Work satisfaction	0.62	0.50	0.42	0.55	-0.48	0.58	0.44	--	
Impatience/ irritability*	0.06	-0.07	-0.02	-0.17	0.44	-0.31	-0.34	-0.47	--
PSS	-0.35	-0.41	-0.38	-0.45	0.55	-0.39	-0.55	-0.61	0.53

*Reverse scored item

HWQ: Health and Work Questionnaire mean score; PSS: Perceived Stress Scale mean score

Table 3. Comparing results of the PSS and the HWQ by sex.

	Male	Female	
	N = 25	N = 142	
Description	Mean (SD)	Mean (SD)	p
Total HWQ	6.5 (0.7)	6.3 (0.7)	0.298
Productivity	7.2 (1.3)	7.4 (0.9)	0.461
- own assessment	7.3 (1.7)	7.5 (1.2)	0.414
- other's assessment	7.3 (1.5)	7.5 (1.2)	0.483
Concentration/focus	3.7 (2.2)	3.4 (2.1)	0.446
Supervisor relationship*	8.4 (2.1)	6.9 (2.7)	0.005
Non-work satisfaction	7.8 (2.1)	7.8 (1.8)	0.954
Work satisfaction	7.6 (1.5)	7.2 (1.7)	0.348
Impatience/irritability	3.2 (1.6)	3.2 (1.6)	0.934
PSS	15.8 (6.4)	16.7 (6.2)	0.552

*t-test, two-sided test of equality; equal variances not assumed

DISCUSSION

Findings suggested there is an inverse association between overall stress and productivity; higher PSS scores were associated with lower HWQ scores. These findings are consistent with other cross-sectional studies comparing productivity and other measures of psychological well-being.^{1,8,9,10} Thus, employer efforts to decrease stress in the workplace may benefit employee productivity levels.

In addition, males scored higher for supervisor relations in the HWQ than females. This finding may suggest that males have stronger relationships with their supervisors. Indeed, there is compelling evidence to suggest the main factor affecting job satisfaction and performance is the relationship between supervisors and employees.¹³ Although, this relationship may be mitigated by employee-supervisor interactions of sex, race/ethnicity, status, education, age, support systems, and other factors, none of which were evaluated in the current study.

For example, Rivera-Torres et al.¹⁴ suggested that women with support systems, defined as co-workers and supervisors, experienced less work stress than males. Results from this study seemed to support Rivera-Torres et al.¹⁴ in that females tended to report higher levels of stress compared with males (although not significant) and reported weaker relationships with their supervisors. In addition, Peterson¹⁵ evaluated what employee's value at work and found that males and females differed significantly. When asked to rank work values, men valued pay/money/benefits along with results/achievement/success most, whereas women valued friends/relationships along with recognition/respect. Perhaps, more research is necessary to understand the nuances between co-worker and supervisor regarding work satisfaction and productivity.

The study contributes to the literature in the use of different metrics for psychological well-being, defined as stress. Multiple organizations within Kansas were evaluated for both productivity and stress.

To our knowledge, the PSS and HWQ have never been used together to measure the relationship between stress and productivity. Results suggested that overall productivity (HWQ) was associated with the HWQ “work satisfaction” subscale. Perceived stress also had the strongest inverse relationship with HWQ sub-scale “work satisfaction” when compared with HWQ sub-scale “productivity”.

This study suggested that productivity, stress, and job satisfaction were correlated, therefore, additional research needs to include each of these variables in greater detail as the current literature has been mixed on their relationships and potential collinearity. For example, one study examining two occupations suggested psychological well-being (defined as psychological functioning) was associated with productivity, whereas job satisfaction did not.⁷ In contrast, another study suggested that psychological well-being has been a bigger factor in job productivity than work satisfaction alone, but both are associated with job productivity.⁹ This current study was able to examine this relationship by using the PSS and the HWQ together.

More research is needed to understand these differences by standardizing terminology. In this study, psychological well-being was defined as stress. However, other studies have defined psychological well-being as happiness or as one’s psychological functioning.^{7,8} This study also expanded the relationship between psychological well-being and stress. Previous research focused more on the relationship between productivity and burnout or job satisfaction.

This study had limitations such as a small sample size (in number of organizations and number of employees). The sample size assessed small organizations in the United States, whereas many other large scale studies on stress occurred over multiple large organizations in other countries.¹¹⁰ There was limited racial diversity in the current study, as 6.1% (10 of 165) reported being non-white. The population studied was also primarily female, limiting the strength of comparisons made between sexes. Furthermore, because worksites often share computers, questionnaires may have been completed using the same IP address; thus, we were unable to prevent multiple entries from the same individual.

The current study did not detect a difference in productivity or stress by race. This differed from other research. For instance, non-whites experience greater overall stress than whites potentially attributable to poorer employment status, income, and education.¹⁶ Non-whites experience stress secondary to racial discrimination.^{17,18} In one study, when examining productivity among university faculty, non-whites reported greater stress and produced less research (productivity) compared to whites.¹⁶ Further research needs to be conducted on productivity and stress by race and ethnicity, and associated variables, such as employment status, income, education, and occupation, need to be accounted for in analysis. Differences between other research and the current study regarding race may be attributed to the fact that only 6% of respondents who answered race reported being non-white, making racial diversity in this study limited, although representative of the population sampled.

CONCLUSIONS

This study suggested there is a negative correlation between overall stress and productivity: higher stress scores were significantly associated with lower productivity scores. This negative association was observed for all HWQ subscales, but was especially strong for work satisfaction. This study also suggested that males may have better supervisor relations compared to females, although no differences between sexes were observed by perceived levels of stress. There was no difference in productivity or stress by race. The results of this study suggested that employer efforts to decrease employee stress in the workplace may increase employee productivity.

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