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# Path Analysis to Identify Predictors of Stress and Impact on Productivity in a U.S. Financial Services Company

Mary L. Marzec, Ph.D., Dee W, Edington, Ph.D.

## ABSTRACT

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**OBJECTIVES:** To investigate predictors of stress and its impacts on productivity (absenteeism and presenteeism) using path analysis.

**METHODS:** The study sample was employees of a U.S. financial services company that participated in the 2012 HRA. Stress was assessed as “stress that affects one’s health” Control variables included age, gender and job classification.

**RESULTS:** The participation rate was 92% (N = 1,139). Thirty-five percent of participants reported stress that affected their health. Feeling anxious and lower job satisfaction were the strongest predictors of stress. ( $\beta = 0.50$  and  $\beta = -0.55$  respectively). There was no evidence for either light or vigorous physical activity as a predictor of stress ( $\beta = -.03$ ; P = 0.27 for vigorous physical activity and  $\beta = -0.03$ ; P = 0.44 for light physical activity). Similarly the path coefficient between care giving and stress was not statistically significant ( $\beta = 0.03$ ; P = 0.16). Stress was positively associated with both absenteeism ( $\beta = 0.24$ ).and presenteeism ( $\beta = 0.12$ ).

**CONCLUSIONS:** Stress that impacts health is prevalent, as it was reported by over a third of employees. Lower job satisfaction and feeling anxious were predictors of stress. This should be of concern for employers as factors in the workplace are likely contributing to stress. Since stress impacted both absenteeism and presenteeism it should be a major priority for employers and health promotion practitioners interested in impacting economic outcomes. Stress reduction would likely have significant economic impact because improvements in both absenteeism and presenteeism would be expected.

## INTRODUCTION

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Chronic stress is prevalent in the United States and negatively impacts health and functioning. The National Institutes of Occupational Safety and Health (NIOSH) reported that high levels of emotional exhaustion at the end of the work day is the norm for 25% to 30% of the workforce.<sup>1</sup> Stress is particularly relevant for employers and those engaged in occupational health as it has deleterious effects on measures of productivity such as absenteeism and presenteeism. In a study utilizing self-reported data of 250 worksites, Jacobson et al. found perceived stress to associated with absenteeism independent of other confounders (age, gender, education,

smoking, alcohol consumption, blood pressure, cholesterol, body mass index, and physical activity).<sup>2</sup> A more recent British study reported that stress, depression or anxiety accounted for 13.8 million days absent or 46% of all illness-based absence. Stress and related conditions were the largest contributor for absences.<sup>3</sup> Examples of stress-related factors associated with increased absenteeism include excessive physical or mental demands, low job control, and procedural injustice.<sup>4-8</sup>

Presenteeism is defined as being at work, but having reduced productivity or ability to perform on the job due to health-related or emotional problems. One study showed

### KEY WORDS:

Stress, Productivity, Absenteeism, Presenteeism, Health Risk Appraisal, Emotional Health

presenteeism among stressed individuals to be five times greater than for non-stressed employees after controlling for age, gender and other lifestyle factors.<sup>9</sup> Another study also showed lower performance for those reporting their job stressful.<sup>10</sup> Information on predictors of stress, its prevalence and its impact on productivity outcomes is important to inform workplace policies and wellness program strategies.

Despite its widespread impact on individuals, stress is challenging to assess and compare across studies. It is not measured in a uniformly as is blood pressure or body weight. The assessment of stress is often specific to a scale or series of questions designed to assess specific facets of stress such as depression, anxiety, task overload or interpersonal relationships.<sup>11-13</sup> Incorporating multi-item stress scales into health assessment tools and employee surveys is challenging due to additional respondent burden. Additionally combining a stress scale that was designed as a stand-alone tool into a health assessment tool may compromise the integrity of the scale.<sup>14</sup> Therefore, research using a single item measure of stress that could be compared across populations and studies would be a useful addition to the field. One aspect of this study is that it utilizes a single item measure of stress, anchored in the respondent's experience of having stress that impacts their health. This implies both a severity and longitudinal quality of stress that is relevant to employers and public health entities.

The objectives of this study were to add to extant research on stress in terms of prevalence, identify predictors of stress, and explore the impact of stress on productivity measures (absenteeism and presenteeism). The study population was employees of a U.S. financial services company. The data for this study was from the University of Michigan Health Risk Appraisal (HRA). Health Risk Appraisals are self-administered questionnaires designed to assess multiple to assess several facets of health and includes items addressing behavioral, emotional and physiological measures. As such, it is well suited for this type of exploratory analysis investigating predictors of stress. Path analysis was used to identify predictors of stress and the impact of stress on productivity. Implications for workplace policies and wellness program

intervention strategies are discussed.

## THEORETICAL BASIS FOR PREDICTORS OF STRESS

Path analysis model formation was based on previous work<sup>15</sup> and evidence from the literature. Variables of interest include feeling anxious, job satisfaction, physical activity and care giving as predictors of stress that affects one's health. Outcome variables in the model are absenteeism and presenteeism.

## FEELING ANXIOUS

Previous work using employees of a utility provider indicated that the item "feeling tense, anxious or depressed" may represent a transient condition and it was not related to absenteeism. Whereas, stress affecting health appeared to represent long-term stress and was related to absenteeism.<sup>15</sup> Another study on predictors of behavior change intention also showed different dynamics between feeling anxious and stress affecting health on the outcome of interest.<sup>16</sup> However, the potential for "feeling anxious" as a predictor of stress was not previously explored and is considered in this study.

### HYPOTHESIS 1:

- a) Feeling anxious is expected to be positively related to stress affecting health.
- b) Stress affecting health may also impact feeling anxious (reverse path).

## JOB SATISFACTION

The literature indicates mixed findings for the relationship between job satisfaction and stress. The majority of research indicates an inverse relationship between job satisfaction and stress, such that higher job satisfaction is indicative of lower stress. Correlates of job satisfaction include appropriate work demands,<sup>17</sup> input as to work expectations,<sup>18</sup> higher organizational engagement<sup>19</sup> and positive attitude toward job and organization.<sup>20</sup> All of these would predict lower stress.

Conversely, there are also a few studies that show higher job satisfaction to be associated with higher stress. Studies of professions typically associated with advanced college degrees show concurrent high job satisfaction and high stress. One study of pharmacists indicated pharmacists were generally satisfied

with their occupation while also noting stress from short staffing practices and the need to constantly development professionally to maintain competence.<sup>21</sup> A study of 111 neonatologists found that 60% reported their work to be moderately or severely stressful. Twenty percent suffered a stress related illness with the past 5 years. However only 17% reported being moderately or very dissatisfied with their occupation.<sup>22</sup> Thus, among specific professions job satisfaction and stress are not exclusive of each other.

#### **HYPOTHESIS 2:**

- a) Job satisfaction is expected to be negatively associated with stress.
- b) Stress may also impact job satisfaction, thus both directions of influence will be considered.

#### **PHYSICAL ACTIVITY**

Physical activity has been associated with better health status<sup>23</sup> and improved mood.<sup>24</sup> Evidence of a link between physical activity levels and reductions in stress exists in the literature.<sup>25-26</sup> Physical activity has been recommended for treatment of clinical mental disorders and sub-clinical symptoms of anxiety, depression and stress.<sup>27-28</sup> Previous work also showed physical activity to be negatively correlated with stress that affects one's health. Higher physical activity correlated with lower stress.<sup>16</sup> Therefore, it is expected that both vigorous and light physical activity should be inversely related to stress.

#### **HYPOTHESIS 3:**

- a) Physical activity is expected to be inversely related to stress.

#### **CARE GIVING**

Several studies have indicated deleterious impact of care giving on life satisfaction, stress, and individual health. Burton et al. studied financial services employees and found care givers to have significantly higher rates of reporting depression, anxiety, sleep problems, stress, smoking and physical inactivity than non-care givers. Caregivers also reported higher rates of work limitations in terms of time management, performing physical tasks, ability to concentrate and engage with others. Unfortunately, absenteeism was not an outcome measure of this study.<sup>29</sup>

In terms of care giving and work behaviors, the literature largely distinguishes two dynamics. First is family-work conflict (FWC) where family interferes with work. Second is work-family conflict (WFC) where work interferes with family. In terms of absenteeism, studies utilizing cross-sectional data showed FWC (family interference with work) to be correlated with absenteeism, but WFC typically is not correlated with increased absenteeism.<sup>30-32</sup> It follows that individuals who report work commitment interfered with family would not have increased absence. However, a Dutch study found increased likelihood of absence regardless of the direction of family-work conflict.<sup>33</sup>

#### **HYPOTHESIS 4:**

- a) Care giving is expected to be directly related to stress.
- b) Care giving may also be directly related to absenteeism and presenteeism.

Figure 1 shows the hypothesized model including potential predictors of stress, absenteeism and presenteeism as outcomes impacted by stress.

#### **METHODS**

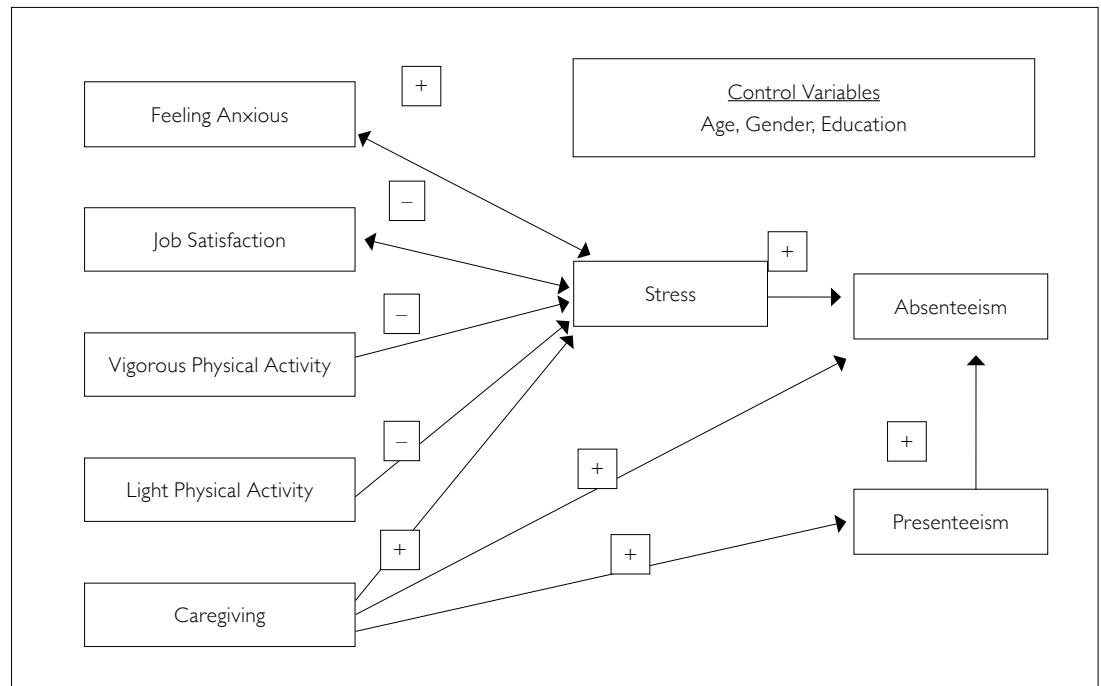
##### **DESIGN**

This is a cross-sectional, observational study. The eligible population was 2012 active employees of a U.S. financial services organization (N = 1,233). More specifically, the employer specializes in equities and investments. The HRA data were from 2012. Path analysis was used to assess predictors for stress. Age gender and education status were controlled for. Predictor variables were feeling anxious, job satisfaction, vigorous and light physical activity and care giving as predictors of stress. Both absenteeism and presenteeism were modeled as outcome measures. Approval for this work was obtained from the University of Michigan Institutional Review Board (IRB Number HUM00019516) and individual consent was obtained from participants for use of the data in aggregated research.

##### **STRESS MEASURES**

This study focuses on "stress that affects one's health" as a measure of perception of

Figure 1. Hypothesized Model for Predictors of Stress and Productivity



enduring stress. This appears to represent long-term stress and has shown to be related to absenteeism as a productivity measure in previous work done in a sample of employees of a utility organization.<sup>15</sup> A second measure of stress in terms of “feeling anxious, tense or depressed” was also included as a potential predictor for long-term stress. Previous work indicated that this measure represented a more transient condition that did not impact absenteeism<sup>15</sup>. However, the potential for “feeling anxious” as a predictor of stress that affects one’s health was not previously explored and is considered in this study.

Other factors include care giving, physical activity and job satisfaction. Care giving was assessed according to whether an individual took time from work in the past two weeks to care for a child, adult or elder. General job satisfaction was assessed. Two measures of physical activity were included which consisted of vigorous physical activity and an item for more moderate physical activity such as brisk walking.

#### PRODUCTIVITY MEASURES

Absenteeism and presenteeism as measures of productivity were assessed as outcome variables according to stress. Absenteeism

was assessed according to self report of days of work missed in the past year due to personal illness. Presenteeism is defined as being at work, but having less than optimal productivity due to physical or emotional problems. A subset of the Work Limitations Questionnaire (WLQ) was included on the HRA in order to assess presenteeism.<sup>34</sup> Eight questions (2 from each WLQ work domain) were included from the original WLQ questions. The eight-item subset of questions has been used in previous studies involving financial service employees.<sup>29, 35-37</sup> and manufacturing employees.<sup>38</sup> Table 1 shows items from the HRA used in the study.

#### POPULATION AND STUDY SAMPLE

The eligible population was active employees of a U.S. financial services organization during 2012 (N = 1,233). The study sample included those who participated in the Health Risk Appraisal (HRA) in 2012 (N = 1,139). The participation rate was 92%.

#### STATISTICAL ANALYSIS

Demographics of the HRA respondents were assessed and compared to non-HRA respondents using t-tests for continuous variables and chi square tests for categorical variables.

Table 1. Health Risk Appraisal Items - Due to Proprietary Issues the questions in this Table have been removed

Variable	Health Risk Appraisal Question
Stress	
Feeling	
Job Satisfaction	
Caregiving	
Vigorous Physical Activity	
Light Physical Activity	
Absenteeism	
Presenteeism	

Statistical significance was set at  $p < 0.05$ .

For the path analysis, a preliminary analysis using Spearman correlation matrix identified potential pathways of relevant variables. Path analysis model fit was based on chi square values with degree of freedom, goodness of fit index (GFI), comparative fit index (CFI), root mean square residual (RMR) values, root mean square of approximation (RMSEA), modification indices and importance of the variable to the model according to the pathway estimates. For the path analysis model, statistical significance level was set at  $P < 0.05$ . However, the sample size is large ( $N > 200$ ) and the chi square statistic

is sensitive to sample size. Thus, a significant chi square is typically not considered problematic.<sup>39</sup> Instead, RMSEA was considered as the best critical fit index because the sample size for this project is large. The sample size consideration is included in the RMSEA definition ( $RMSEA = \sqrt{[(\text{chi square}/df - 1) / (N - 1)]}$ ). Theoretical appropriateness of relationships, significance of path estimates and model fit were all considered as criteria.

T-tests, chi-square, logistic regression and correlation analyses were performed with SAS 9.0. (SAS Institute Inc., Cary, NC). The path analysis modeling was performed using AMOS 20.0 (SPSS, Chicago, IL).

Table 2. Eligible Employees and HRA Participant Demographics

	<b>Eligible Employees</b>	<b>2012 HRA Participants</b>	<b>2012 HRA Non-Participants</b>
<b>N</b>	1,233	1,139	94
<b>Participation Rate</b>	100%	92%	8%
<b>Gender</b>			
Male	57.70%	56.40%	60.60%
Female	43.30%	43.60%	39.40%
<b>Age</b>			
19 - 24	1.9%	1.5%	6.4%
25 - 34	18.3%	18.1%	20.2%
35 - 44	34.5%	35.1%	26.6%
45 - 54	33.3%	33.6%	29.8%
55 - 64	10.3%	10.2%	11.7%
65 +	1.8%	1.5%	5.3%
<b>Average Age (Mean ± Std. Dev.)</b>	43.4 ± 9.8	43.5 ± 9.5	43.2 ± 12.0
<b>Percent Exempt</b>	72.6%	72.8%	70.2%
<b>Job Status (% Full-time)</b>	98.1%	98.7%	91.5%

## RESULTS

Out of the 2012 active employees (N = 1,233), 92% participated in the Health Risk Appraisal in 2012 (N = 1,139). The HRA participants were 56.4% male with an average age of 43.5 years and 72.8% had exempt job status. The HRA participants were similar to the non-participants for age, gender and exempt status. Table 2 shows demographic information for the eligible employees HRA participants and HRA non-participants. Additionally, 83.4% of HRA participants reported having a college degree. Unfortunately, education status was not available for the eligible population or non-HRA participants.

## STRESS PREVALENCE

For 2012 HRA participants (N = 1,139), 34.9% reported having stress that affected their health “some” or “a lot”. Prevalence was higher within females with 39.6% reporting stress as compared to 31.3% for the male HRA participants (P < 0.01).

## DESCRIPTIVE STATISTICS AND PRELIMINARY ANALYSIS FOR MODEL DEVELOPMENT

The ranges, means and standard deviations for variables included in the structural equation model are shown in Table 3. The average for stress was 2.2, which corresponded closest to “hardly any” for the overall sample. Average absenteeism was 0.8 or about 1 day absent in the past year due to personal illness. Average score for vigorous physical activity was 2.9 or approximately 3 days per week. The average score for light activity was 3.8 or approximately to 3-4 days per week.

## CORRELATIONS

Correlation analysis was utilized to explore associations between variables for building the structural equation model (see Table 3). For stress, high correlation was noted between “stress affecting health” and “feeling anxious” ( $r_s = 0.50$ ;  $p < 0.001$ ). Stress was negatively correlated with job satisfaction, such that higher stress was associated with lower job satisfaction ( $r_s = -0.25$ ;  $P < 0.001$ ). Both vigorous and light physical activity was

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Table 3. Descriptive Statistics and Correlations for Structural Equation Model Variables

HRA Participants (N = 1,139)										
Variable	Range	Mean ± Std. Dev.	1	2	3	4	5	6	7	8
1. Stress Affecting Health	1 - 4	2.2 ± 0.8	1							
2. Feeling Anxious	1 - 4	2.4 ± 0.7	.54	1						
3. Job Satisfaction	1 - 4	3.2 ± 0.6	-.25	-.30	1					
4. Vigorous Physical Activity	1 - 4	2.9 ± 1.0	-.17	-.21	.08	1				
5. Light Physical Activity	1 - 6	3.8 ± 1.3	-.13	-.14	.10	0.67	1			
6. Caregiving	0 or 1	0.12 ± 0.3	-.06 P = 0.03	.05 P = 0.1	-.04 P = .15	-.08	-.03 P = .30	1		
7. Presenteeism	0 - 4	0.22 ± 0.7	.13	.10	-.06 P = .04	-.03	-.01 P = .69	.10	1	
8. Absenteeism	1 - 6	1.8 ± 0.8	.24	.13	-.16	-.07	-.05 P = .04	.08 P = .01	.10	1

P < .01 for all correlation coefficients unless otherwise stated

negatively correlated with stress ( $r_s = -0.17$ ;  $P < 0.01$  and  $r_s = -0.13$ ;  $P < 0.01$  respectively). Physical activity did not correlate strongly with absenteeism ( $r_s = -0.07$ ;  $P < 0.01$ ) and  $r_s = -0.05$ ;  $P = 0.04$  respectively). Thus, direct paths between physical activity and stress are supported. There is no evidence for direct paths between physical activity and absenteeism. Care giving was not strongly correlated with stress or absenteeism. The correlations do support a direct path between care giving and presenteeism ( $r_s = 0.10$ ;  $p < 0.01$ ). Stress was positively correlated with absenteeism ( $r_s = 0.24$ ;  $p < 0.01$ ).

#### PATH ANALYSIS MODEL

Unstandardized coefficients, standardized coefficients, standard errors and p-values for the path coefficients including the control variables are shown in Table 4. Unstandardized coefficients indicate the association between variables in units according to the variables. Standardized coefficients indicate the amount of change per one standard deviation of the variables. Therefore, standardized coefficients are typically used when showing relative influence of variables within the model.<sup>39</sup> All path coefficients discussed in the text and shown in Figure 2 are standardized values.

Figure 2 illustrates the path analysis model with absenteeism and presenteeism as outcome variables. The model fit statistics

indicated a good fit between the model and data (chi-square = 51.6 degrees of freedom = 17, GFI = 0.99, CFI = .977, RMR = 0.02 and RMSEA = 0.042). Consistent with hypothesis 1 “feeling anxious” was a predictor for stress ( $\beta = 0.50$ ). However, the impact of stress on feeling anxious was not statistically significant. In support of hypothesis 2, job satisfaction was inversely associated with stress such that lower job satisfaction predicted greater stress ( $\beta = -0.55$ ). To a lesser extent, the model also supported a direct relationship between job satisfaction and stress ( $\beta = 0.36$ ). Although both forms of physical activity were inversely associated with stress, the path coefficients were not statistically significant ( $\beta = -0.03$ ;  $P = 0.27$  for vigorous physical activity and  $\beta = -0.03$ ;  $P = 0.44$  for light physical activity). So, hypothesis 3 was not supported in this sample. Similarly the path coefficient between care giving and stress was positive but not statistically significant ( $\beta = 0.03$ ;  $P = 0.16$ ). Part of hypothesis 4 was supported in that care giving impacted presenteeism ( $\beta = 0.10$ ), but not absenteeism ( $\beta = 0.05$ ;  $P = 0.08$ ). Stress was positively associated with absenteeism ( $\beta = 0.24$ ) and presenteeism ( $\beta = 0.12$ ).

Although a relationship between feeling anxious and physical activity was not hypothesized, we modeled these relationships based on the correlation matrix ( $r_s = -0.21$ , Table 4). Vigorous physical activity



Table 4. Path Estimates for Final Model Using Absenteeism and Presenteeism as Outcome Measures

			Path Estimate	Standardized Path Estimate	Std. Error	P-value
Gender	→	Stress	<b>.20</b>	<b>.13</b>	<b>.05</b>	***
Age (5 year categories)	→	Stress	.02	.05	.01	.09
Education	→	Stress	.05	.05	.03	.10
Feeling Anxious	→	Stress	<b>.71</b>	<b>.66</b>	<b>.20</b>	***
Stress	→	Feeling Anxious	-.02	-.03	.27	.93
Job Satisfaction	→	Stress	<b>.49</b>	<b>.36</b>	<b>.19</b>	.01
Stress	→	Job Satisfaction	<b>-.41</b>	<b>-.55</b>	<b>.12</b>	***
Vigorous Physical Activity	→	Stress	-.03	-.04	.03	.27
Vigorous Physical Activity	→	Feeling Anxious	<b>-.14</b>	<b>-.20</b>	<b>.04</b>	***
Light Physical Activity	→	Stress	-.02	-.03	.02	.44
Caregiving	→	Stress	.10	.03	.07	.16
Caregiving	→	Presenteeism	<b>.19</b>	<b>.10</b>	<b>.06</b>	.001
Caregiving	→	Absenteeism	.13	.05	.07	.08
Stress	→	Presenteeism	<b>.10</b>	<b>.12</b>	<b>.02</b>	***
Stress	→	Absenteeism	<b>.25</b>	<b>.24</b>	<b>.03</b>	***
Presenteeism	→	Absenteeism	<b>.08</b>	<b>.06</b>	<b>.04</b>	<b>.04</b>

\*\*\* P &lt; 0.001

Note: Statistically significant paths in bold

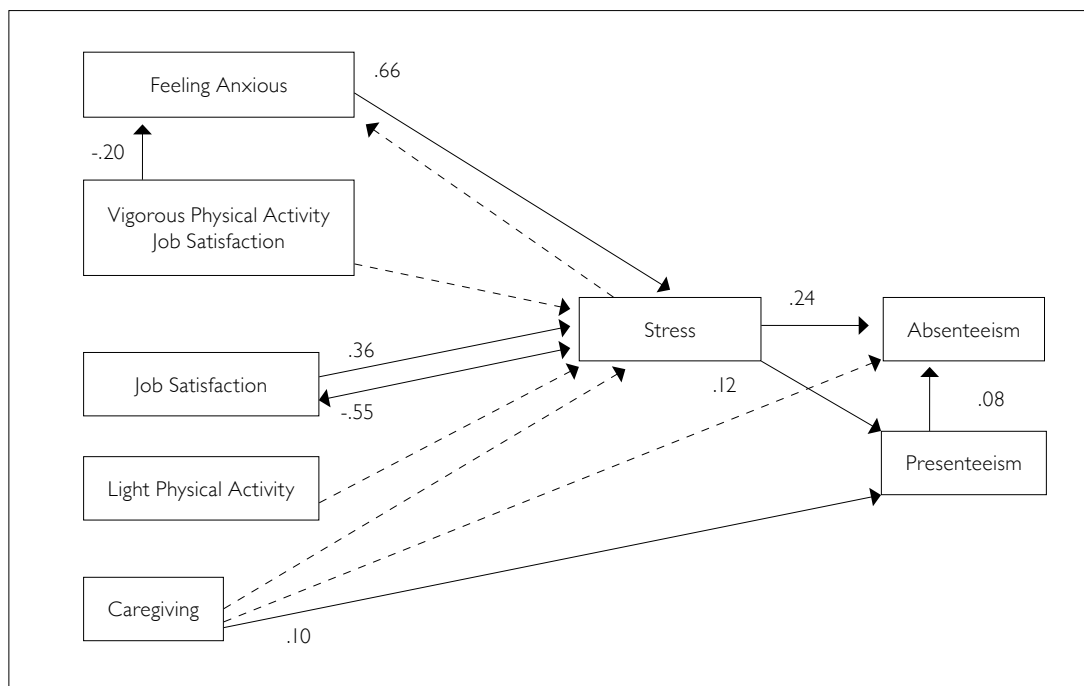
influenced feeling anxious such that more vigorous physical activity predicted lower levels of feeling anxious ( $\beta = -0.20$ ). There was no evidence for a similar relationship for light physical activity.

## DISCUSSION

This study was conducted using HRA data and path analysis to assess prevalence, predictors of stress and its impact on productivity. Thirty-five percent of employees reported stress affecting their health “some” or “a lot” of the time. Comparison with other studies is limited due to lack of consistent measures for stress in the literature. One study using the same measure reported a similar prevalence of 34.5% among employees of a U.S. utility company.<sup>15</sup> Our data are also in line with government reports stating that emotional exhaustion at the end of the work day is the norm for 25% to 30% of the workforce.<sup>1</sup> At these levels, stress is similar to obesity in prevalence<sup>40-41</sup> which has been deemed an epidemic.

According to the path analysis results, feeling anxious was a predictor for stress. Stress was negatively associated with job satisfaction as the primary path of influence ( $\beta = -0.55$ ), which is consistent with the majority of the literature. However, in this sample high job satisfaction was correlated with higher stress as well ( $\beta = 0.36$ ). This apparent paradox is not commonly cited in the literature, but does have precedence. A study focusing on “Type A” personality types showed that individuals cited high stress concurrent with high job satisfaction. The study also noted this group was more likely to perceive situations as stressful than the comparison group of “Type B” individuals. Studies of pharmacists, medical doctors and other professional fields also report high stress concurrent with high job satisfaction.<sup>21-22, 42</sup> Though only speculation is possible here, an indication that this dynamic may be relevant is that the participants are employees of a company that specializes in equities and investments. Seventy-three percent have exempt status

Figure 2. Final Model for Predictors of Stress and Productivity



Note: Dashed lines indicate hypothesized paths that were not statistically significant

and 83.4% were college educated. Thus, these individuals may have more responsibilities, stronger job commitment, and more stress. Demerouti et al. found that more committed individuals are more likely to tolerate stressful work situations, but at some point this dynamic disintegrates as “burnout” sets in.<sup>43</sup> While sources of stress were not examined in this work, the findings suggest that work-related factors may be a significant source of stress for individuals.

Generally, studies indicate that physical activity improve mood and decrease anxiety and stress.<sup>24, 27-28</sup> In this study, neither light/moderate physical activity nor vigorous physical activity were protective of stress in this sample. These findings differ from previous work showing physical activity to be inversely associated to stress.<sup>15-16</sup> Additional modeling showed vigorous physical activity to be protective of feeling anxious ( $\beta = -0.20$ ). Though more work is needed to investigate this phenomenon, it is possible in this population that feeling anxious represents a lower level of stress. More moderate stress may be more easily remediated by interventions such as physical activity as compared to stress affecting health.

Care giving was not a predictor for stress ( $\beta = 0.03$ ;  $P = 0.16$ ), but was associated with presenteeism ( $\beta = 0.10$ ;  $P = 0.001$ ). These results are similar to others that have noted presenteeism in association with care giving.<sup>29</sup>

In terms of productivity outcomes and stress, stress impacted both absenteeism ( $\beta = 0.25$ ) and presenteeism ( $\beta = 0.10$ ). Care giving was associated with presenteeism, but not absenteeism. This suggests stress had a greater impact on productivity overall than care giving. These findings are consistent with previous work showing stress to be a predictor for absenteeism<sup>15</sup> and other studies showing stress to be related to both absenteeism and presenteeism.<sup>2, 6</sup> Similar to our study, VanWormer et al. showed stress as a main predictor of productivity loss (absenteeism and presenteeism combined). One point increase on the stress scale accounted for a 17.6% increase in productivity loss (e.g.: 3.4% productivity loss to 4.0% productivity loss).<sup>9</sup>

#### LIMITATIONS AND FUTURE DIRECTIONS

While this study has strengths in reporting prevalence of stress, predictors of stress and its impact on productivity outcomes, there

are several limitations that should be noted. These findings are limited to employees of a U.S. financial services employer. In this study, over 80% of the sample had college degrees. While, the specific results can not be applied to other populations, these patterns may be consistent with other groups of college-educated, knowledge workers. More research will need to be done in other types of employee populations.

The findings presented in this study are cross-sectional, therefore causation cannot be inferred. An important future direction for this work is to assess predictors of stress longitudinally to investigate if changes in these factors result in changes in stress.

Also, job satisfaction and stress were measured in a general way. Further work elucidating sources of job satisfaction and sources of stress may elucidate the seemingly paradoxical relationships where stress decreased job satisfaction, but those with high job satisfaction also tended to be stressed. Lastly, findings for physical activity were mixed since vigorous physical activity impacted feeling anxious but not stress. Additional studies to illuminate the impact of physical activity on different types or levels of stress would be a useful addition to this work.

## CONCLUSIONS

This study indicates that individuals reporting

stress to the extent that it impacts their health is prevalent. Lower job satisfaction and feeling anxious were significantly related to stress. This should be of concern for employers since it is likely factors in the workplace are contributing to stress. Furthermore, stress has significant economic implications for employers as it affects absenteeism and presenteeism. In terms of specific strategies, physical activity interventions may be helpful for those reporting feeling anxious, but not as a stand-alone strategy for those with stress to the extent that health is impacted. For those with more significant stress, strategies that are more comprehensive should be enacted. Since stress appears to contribute to both absenteeism and presenteeism, its remediation could have benefits of a significant magnitude since improvements in both measures would be expected. Organizations interested in impacting productivity and other economic should prioritize stress reduction on an equal or greater level than physical health or dietary interventions.

## AUTHORS

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