EFFECT OF WORKPLACE STRESS ON JOB PERFORMANCE

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ABSTRACT

The study examines the relationship between workplace stress and job performance. A survey method was employed to gather self-administered questionnaires from executive and non-executive employees of a leading private investment bank in Peninsular Malaysia. The outcomes of SmartPLS path model analysis of the data showed two important findings: firstly, physiological stress was positively and significantly correlated with job performance. Secondly, psychological stress was positively and significantly correlated with job performance. This finding reveals that physiological and psychological stresses act as important predictors of job performance in the studied organization. The paper provides discussion, implications and conclusion.

Keywords: Physiological stress, Psychological stress, Job performance

JEL: M10, M12, L8

1. INTRODUCTION

Workplace stress is a major issue for both employees and organization. It is a common term used in our life with most people having different understanding about its meaning. Despite different understanding of its meaning, it is a mind-body-environment relationship. Selye (1987, p. 17) for example, described stress as a "non-specific response of the body to any demand placed upon it." The term 'non-specific' was later refined by Chrousos and Gold (1992) and limited to stress syndrome occurring when stressors are pushed above their threshold (Marketon and Glaser, 2008). Glazer and Gyurak (2008) noted that the terms stress, stressor and strain are often used interchangeably but rather erroneously in the extant literature. Both Selye (1987) and Marketon and Glaser's (2008) descriptions of stress imply the origin of the word as a subject from the concept of resistant in physics which was extended to the field of psychology (Michael et al., 2009).

Leung et al. (2012) further clarified that stress is a psychological state of mind resulting from demands put on a person's body. From the medical point of view, stress has often been proven to be detrimental to health (Kozusznik et al., 2012). Perhaps one of the explanations for the inverse relationship between stress and health is that stress deregulates immune function which may lead to activation of cancer cells and latent herpes viruses, delayed wound healing and impaired vaccine responses (Marketon & Glaser, 2008).

Although the above snapshot on stress carries a negative connotation, stress is multifaceted and at times brings out goodness (Farler and Broady-Preston, 2012). According to Kozusznik et al. (2012), the word stress in Chinese encompasses two characters which represent "crisis" and "opportunity." In the extant literature stress has similarly been seen as having two implications; eustress and distress conditions (Selye, 1964, 1987; Ismail et al., 2010; Yu-Fei (Melissa) et al., 2012). Eustress refers to the

positive feeling which arises from a stressful condition while distress relates to threats and harmful effects (Kozusznik et al., 2012). Code and Langan-Fox (2001), Mayer (2000), Ismail et al. (2010), Gachter et al. (2011), Yu-Fei et al. (2012) and Leung et al. (2012) argued that eustress may occur when individuals are able to handle external demands placed on their physique which may lead to decreased physiological and psychological stress (e.g. pleasant life, able to control feelings of anxiety and being proactive). Distress on the contrary may exist when individuals cannot cope with external demands placed on their bodies and end up with increased physiological and psychological stress (e.g. sickness, unpleasant life, unable to control feelings of anxiety, and passive).

In the field of management, workplace stress has come to the core of research as the costs to organizations and employees (Arshadi and Damiri, 2013; Webster et al., 2010). Farler and Broady-Preston (2012) suggested that a workplace is a community of its own, hence employees derive their sense of identity and belongingness from it. Stress in the workplace would therefore affect employees significantly and ultimately the performance of the entire organization would also be at stake (Ahmad Ezane et al., 2012).

The commonly cited implications of workplace stress include low job performance and high turnover intention (Arshadi and Damiri, 2013), lack of motivation and ill health (Farler and Broady-Preston, 2012) as well as burnout (Ahmad Ezane et al., 2012). Keshavarz and Mohammadi (2011) added low morale, poor product quality, low output, increased overtime payment, and organizational sabotage to the list of negative effects of workplace stress. In Great Britain, job-related stress has translated into an annual loss of 28 million work days (Devonish et al., 2012), while in the USA it has resulted in absenteeism and turnover with the monetary cost surpassing a billion US Dollar per year (Kouvonen and Coyne, 2012).

Workplace stress is often viewed as the result of the interaction between the individual and his/her environment (Brown and Uehara, 2008; Ismail et al., 2009, 2010; Keshavarz and Mohammadi, 2011; Santos et al., 2010). According to Lazuras et al. (2009), three main

sources of workplace stress (stressors) are: relationship with work colleagues, organizational constraints and workload. In their case study of library staff, Farler and Broady-Preston (2012) similarly outlined routine and repetitive job tasks and lack of control over one's job and library patrons (customers) as the causes of stress among library staff studied. Following Glazer and Gyurak's (2008) classification of job stressors, the above mentioned factors can be termed as psychosocial stressors and job role stressors. Apart from psychosocial stressors, there are physical stressors (e.g. noise and heat) as well (Glazer and Gyurak, 2008).

Stress has two major dimensions: physiological stress and psychological stress (AbuAlRub, 2004; Beehr and Glazer, 2005; Larson, 2004). Physiological stress is normally related to as a physiological reaction of the body (such as headache, migraine, abdominal pain, lethargic, backache, chest pain, fatigue, heart palpitation, sleep disturbance and muscle ache) to various stressful triggers at the workplace that directly and negatively affects an individual's productivity, effectiveness, quality of work and personal health (Ismail et al., 2009, 2010; Newell, 2002; World Health Organization, 2005).

Some examples of physiological stress are: changes in eating, drinking, sleeping and smoking habits (Beehr et al., 2001; Beehr and Glazer, 2005). Psychological stress is often seen as an emotional reaction (such as anxiety and depression burnout, job alienation, hostility, depression, tension, anger, nervousness, irritability and frustration) experienced by an individual as a result from the stimulate at the workplace (Ismail et al., 2009, 2010; Millward, 2005; World Health Organization, 2005). Haines III and Saba (2012) suggested that psychological stress is associated with one's role identity. A person typically has multiple role identities (an employee, a husband, a son, etc.) The higher the value a person and his/her society associate with each role, the more the cost of not performing the role would be. An engineer who is denied the opportunity to exercise his professional role, for instance, may experience a psychological stress which is exhibited in mental exhaustion. Similarly, an employee who is deprived of the support due for his professional

identity may also experience psychological stress (Haines II and Saba, 2012)

In terms of eustress, workplace stress will usually occur when employees' knowledge, skills, abilities and attitudes can cope with or match their work demands and pressures in organizations. In this situation, it may increase the ability of employees to manage their physiological and psychological stresses in order to fulfill job demands (Adler et al., 2006; Wetzel et al., 2006; World Health Organization, 2005). Mesmer-Magnus, Glew and Viswesvaran (2012) suggested that positive humor in the workplace by both employee and employer can also help in buffering the effect of stress and improving work performance.

Conversely, in distress, workplace stress will often exhibit when employees' knowledge, skills, abilities and attitudes cannot cope with or do not match their work demands and pressures in organizations. Consequently, it may decrease the ability of employees to control and manage physiological and psychological stress, such as upsetting their self-regulatory bodies, and not able to meet their duties and responsibilities as a member of an organization and a good citizen of a country (Basowitz et al., 1995; Keshavarz and Mohammadi, 2011).

Interestingly, extant studies in the workplace stress show that the levels of physiological and psychological stress may have a significant impact on individual outcomes, especially job performance (Hsieh et al., 2004; Ismail et al., 2009; Wetzel et al., 2006). According to many scholars like McShane and Von Glinow (2005), Kreitner and Kinicki (2012) most organizations have to deal with job performance of their employees. Job performance means assessing individual performance, individual records or subjective evaluation (Chockalingam, 2011). According to Fein (2009), identifying specific job relevant and task behaviors actually is not a new concept in job performance in general management studies. In the past, job performance was also discussed as a specific job outcomes that link to individual work behavior. There is not a single consistent or concise definition of job performance. According to Barrick and Mount (1991), it is in the relation of "Big Five" personality dimensions: extraversion, emotional stability, agreeableness, conscientiousness, and openness to experience. Hunter (1986) claimed that the cognitive ability can predict job performance.

Nowadays, the ability to perform work without stress has rapidly become one of the key issues for management and their organizations (Homayan et al., 2013). They pointed out that most job demand are stressful; hence, there exists a relationship between job stress and performance (task and contextual).

In a workplace stress model, several scholars believe that the ability of employees to properly control and manage their physiological and psychological stress in executing job may lead to higher job performance in organizations (Adler et al., 2006; Hourani et al., 2006; Wetzel et al., 2006; Zhong et al., 2006).

Within an organizational stress model, many scholars concur that physiological stress, psychological stress and job performance are distinct concepts, but strongly interconnected. For example, the ability of employees to properly manage their physiological and psychological stresses in executing job may lead to an enhanced job performance in organizations (Bar-On, 1997; Gillespie et al., 2001; Spector and Goh, 2001).

Although the nature of this relationship is interesting, the role of physiological and psychological stresses as important predictors is inadequately explained in the workplace stress models (Slaski and Cartwright, 2002, 2003; Nikolau and Tsaosis, 2002).

Many scholars argue that the role of physiological and psychological stresses as an important predictor is given less empirical attention in the previous studies. Past studies have been descriptive, describing the global workplace stress concept, explaining the general physiological and psychological features, employing a meta-analysis method to establish the link between physiological and psychological stresses and employee behavior, but ignoring to quantify the magnitude and nature of the relationship between workplace stress and job performance.

Consequently, the results of this study have not

provided adequate recommendations to practitioners in designing and administering workplace stress programs in growth and competitive organizations (Johnston et al., 2013; Kazi and Haslam, 2013; Ismail et al., 2009; Farquharson et al., 2013). Hence, this dearth encourages the researchers to further explore the relationship between physiological and psychological stresses and employee behavior, specifically job performance.

2. OBJECTIVE OF THE STUDY

This study has twofold objectives: first, to examine the relationship between physiological stress and job performance and second, to examine the relationship between psychological stress and job performance.

3. LITERATURE REVIEW

Relationship between workplace stress and employee performance is consistent with the notion of workplace stress model. For example, Karasek's (1979) job demand control model explains that high job demands and levels of control or decision making at work may reinforce high risk of individuals' physiological and psychological stresses (Kain and Jex, 2010). Further, Edward's (1998) P-E fit theory suggests that a lack of fit between job demands and resources may induce two forms of strains, physiology (e.g. raised blood pressure, raised serum cholesterol, and lowered immunity) and psychology (e.g., sleep disturbances, anxiety, panic attacks, dysphoria, and restlessness).

The notion of these theories has gained strong support from the workplace stress research literature. For example, several extant studies about workplace stress were conducted using different samples such as: perceptions of 213 employees at six geographic Logistics Centers within a medium-sized Fortune 500 company in the Southeastern United States (Cincotta, 2005); perceptions of 333 nurses from four hospitals in Kampala, Uganda (Nabirye et al., 2011); 304 call center employees in the UK (Kazi and Haslam, 2013); perceptions of 100 nurses from a large general teaching hospital in Scotland (Farquharson et al., 2013); and

perceptions of 254 nurses over three nursing shifts (Johnston et al., 2013). These studies advocated that high levels of physiological and psychological stresses had decreased employees' competencies in managing, regulating and controlling their job demands and this condition could lead to decreased job performance in the respective organizations (Cincotta, 2005; Farquharson et al., 2013; Johnston et al., 2013; Kazi and Haslam, 2013; 2013; Nabirye et al., 2011). Based on the literature, it can be hypothesized that:

H1: Physiological stress is positively related to job performance.

H2: Psychological stress is positively related to job performance.

4. METHODOLOGY

4.1. Research Design

A cross-sectional research design was employed in this study because it allowed the researchers to combine the workplace stress research literature and the actual survey as a main procedure to collect data for this study. Hence, a back translation technique was employed to translate the content of questionnaire into Malay and English in order to increase the validity and reliability of the instrument. Using this method may help to increase the ability to gather accurate, less bias and high quality data (Cresswell, 1998; Sekaran and Bougie, 2011; Wright, 1996).

This study was conducted in a leading private investment bank in Peninsular Malaysia. The name of this organization is kept anonymous because of confidential reasons. It was incorporated in early 2000's as a public limited company and its main function is to be the pre-eminent provider of investment banking services. As a business entity, this company has restructured its organization and expanded its operation in investment, broking and fund management in order to be a major provider of financial market services. This change has increased employee stress because they have to carry out many challenging tasks, working long

hours and being unable to take leave in order to meet key performance indicators. As a result, this phenomenon may lead to decreased competency of employees in performing daily job. This curiosity motivates the researchers to discover the nature of the relationship in this organization.

4.2. Measures

The survey questionnaire has two major sections: physiological stress (PHST) had 3 items and psychological stress (PSST) had 4 items that were adapted from workplace stress literature (Beehr et al., 2001; Cox et al., 2000; Johnston et al., 2013; Kazi and Haslam, 2013; Farquharson et al., 2013; Newell, 2002; Seaward, 2005). The dimensions used to measure physiological stress are nervous system and endocrine system, while the dimensions used to measure psychological stress are psychological strain and cognitive appraisal.

Finally, job performance (JPN) had 8 items that were adapted from job performance literature (AbuAlRub, 2004; Adler et al., 2006; Beehr et al., 2001; Hourani et al., 2006; Hsieh et al., 2004). The dimensions used to measure job performance are confidence, offer help, communication, problem solving, adaptability, responsive, and work appearance. All items used in the questionnaires were measured using a 7-item scale ranging from "strongly never/strongly disagree" (1) to "strongly always/strongly agree" (5). Demographic variables were used as controlling variables because this study focused on employee attitudes.

4.3. Sample

The unit of analysis for this study is employees who have worked in the organization. In the first step of data collection, the researchers met the head of the organization in order to obtain his permission to conduct this study and also obtain his opinion about the rules for distributing survey questionnaire in his organization. Taking into consideration the organization's rule and the researcher constraints in terms of length of study and budget, 200 survey questionnaires were distributed to executive and non-executive employees in seven departments, using a convenient sampling technique.

This sampling technique was employed because the organization could not provide the researchers with the list of registered employees for confidential reasons. Due to this constraint, the researchers could not employ random sampling among prospective participants in the organization. Out of the total distribution, 132 useable questionnaires were returned to the researchers, yielding a 66 percent response rate. The survey questionnaires were answered by participants voluntarily. The sample number fulfills the requirement of a good decision model as suggested by Krecjcie and Morgan (1970), and exceeds the requirement of minimum sample of probability sampling, showing that it can be analyzed using inferential statistics (Sekaran and Bougie, 2011).

4.4. Data Analysis

The SmartPLS version 2.0 as recommended by Henseler et al. (2009) was employed to assess the validity and reliability of the instrument, and hence test the research hypotheses.

The main advantage of using this method is that it produces latent variable scores, avoids small sample size problems, estimates every complex model with many latent and manifest variables, hassle-stringent assumptions about the distribution of variables and error terms, and handles both reflective and formative measurement models (Henseler et al., 2009).

The PLS path method generated by SmartPLS was used to test the hypothesized model and the outcomes of this test will clearly show the significant relationship between the independent variable and dependent variable if the value of t statistic is larger than 1.96. If the result indicates that the independent variable acts as an important predictor of dependent variable in the hypothesized model (Henseler et al., 2009), then a global fit measure is conducted to validate the adequacy of PLS path model globally based on Wetzels et al.'s (2009) global fit measure. If the result of testing hypothesized model exceeds the cut-off value of 0.36 for large effect sizes of R^2, then this shows that it adequately

supports the PLS path model globally (Wetzels et al., 2009).

5. RESULTS

5.1. Sample Profile

Table 5.1. shows that the majority of respondents were female (53.80 %), aged between 30 and 31 (45.50 %), married (77.30%), degree holders (56.80%), executives (86.40%), serving more than 10 years (49.20%), and drawing a monthly income in the range of RM2000 to RM5000 (77.30%).

5.2. Validity and Reliability Analyses for the Instrument

The confirmatory factor analysis was performed to assess the validity and reliability of the measurement scale. Table 5.2. shows the results of convergent and discriminant validity analyses. All constructs had the values of average variance extracted (AVE) larger than 0.5, indicating that they met the acceptable standard of convergent validity (Barclay et al., 1995; Fornell and Larcker, 1981; Henseler et al., 2009). Besides that, all constructs which had the diagonal values of $\sqrt{}$ AVE greater than the squared correlation with other constructs in off diagonal show that all constructs met the

Table 5.1. Respondents' Characteristics

Respondent Characteristics	Sub-Profile	Percentage
Gender	Male	46.20
	Female	53.80
Age	18 to 30 years old	21.20
	31 to 40 years old	45.50
	41 to 50 years old	27.30
	> 51 years old	6.10
Status	Single	22.70
	Married	77.30
Education	SPM	31.10
	STPM/Diploma	12.10
	Degree	56.80
Job classification	Non-Executive	13.60
	Executive	86.40
Employment	< 1 year	10.60
	2 to 5 years	18.20
	5to 10 years	22.00
	> 10 years	49.20
Monthly Income	< 20000	3.00
(Malaysian Ringgit)	2000 to 5000	77.30
	5000 to 10000	14.40
	> 10,000	5.30

Note:
> SPM: Sijil Pelajaran Malaysia /Malaysian
>   Certificate of Education;
> STPM: Sijil Tinggi Pelajaran Malaysia
>   /Higher School Certificate

acceptable standard of discriminant validity (Henseler et al., 2009).

Table 5.2. The Results of Convergent and Discriminant Validity Analyses

Construct	AVE	PHST	PSST	JPN
PHST	0.6799	**0.8246**		
PSST	0.7550	0.4519	**0.8689**	
JPN	0.6798	0.5185	0.4466	**0.8245**

Table 5.3. shows the factor loadings and cross loadings for different constructs. The correlation between items and factors had higher loadings than other items in different constructs. The variables loaded more strongly on their own constructs in the model, exceeding the specified minimum of 0.7 (Chin, 1998; Fornell and Larcker, 1981; Gefen and Straub, 2005; Henseler et al., 2009). In sum, the validity of measurement model met the criteria.

Table 5.3. The Results of Factor Loadings and Cross Loadings for Different Constructs

Construct/Item	PHST	PSST	JPN
PHST			
Phy1	**0.871073**	0.310906	0.529118
Phy2	**0.857759**	0.286983	0.394263
Phy3	**0.738451**	0.597314	0.316399
PSST			
Psy1	0.397669	**0.851549**	0.333655
Psy2	0.411788	**0.948103**	0.515966
Psy3	0.326355	**0.924053**	0.391539
Psy4	0.514323	**0.736347**	0.220117
JPN			
JPN1	0.533721	0.388549	**0.835873**
JPN2	0.563093	0.440607	**0.835139**
JPN3	0.337223	0.418867	**0.803903**
JPN4	0.301134	0.435055	**0.788973**
JPN5	0.457269	0.388778	**0.811889**
JPN6	0.360990	0.160618	**0.811400**
JPN7	0.434469	0.322781	**0.875628**
JPN8	0.305412	0.299513	**0.830251**

Table 5.4. shows the results of reliability analysis for the instrument. The composite reliability (CR) and Cronbach's Alpha (CA) had values greater than 0.8, indicating that the instrument used in this study maintained high internal consistency (Henseler et al., 2009; Nunally and Benstein, 1994; Sekaran & Bougie, 2011).

Table 5.4. Composite Reliability and Cronbach's Alpha

Construct	CR	CA
PHST	0.863760	0.769776
PSST	0.924344	0.891403
JPN	0.944350	0.933199

5.3. Analysis of the construct

Table 5.5. shows the result of Pearson correlation analysis and descriptive statistics. The means for the variables vary from 4.2 to 4.3 signifying that the levels of physiological stress, psychological stress and job performance range from high (4) to highest level (7). The correlation coefficients for the relationship between the independent variable (i.e. physiological stress and psychological stress) and the dependent variable (i.e. job performance) were less than 0.90, indicating the data were not affected by serious collinearity problem (Hair et al., 2006). The measurement scales that had validity and reliability were used to test research hypotheses.

Table 5.5. Pearson Correlation Analysis and Descriptive Statistics

Construct	Mean	SD	Pearson Correlation Analysis		
			1	2	3
1. PHST	4.3	1.3	1		
2. PSST	4.2	1.5	.52[**]	1	
3. JPN	4.3	1.3	.47[**]	.40[**]	1

Note: ** $p < 0.01$

5.4. Outcomes of Testing Hypotheses 1 and 2

Figure 5.1. shows the outcomes of testing PLS path model. The inclusion of physiological and psychological stresses had explained 39 percent of the variance in job performance. The results of SmartPLS path model analysis revealed two important findings: first, physiological stress significantly correlated with job performance ($\beta=0.42$; t=4.00), therefore supporting H1. Second, psychological stress significantly correlated with job performance ($\beta=0.30$; t=2.60), therefore supporting H2. This result demonstrates that workplace stress is an essential predictor of job performance in the studied organization.
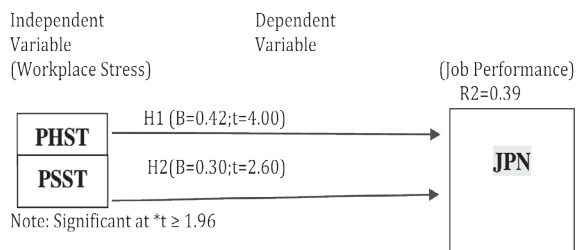

Figure 5.1. Outcomes of Testing PLS Path Method

In order to determine a global fit of PLS path model, we carried out a global fit measure (GoF) based on Wetzels et al.'s (2009) guideline: GoF=SQRT{MEAN (Communality of Endogenous) x MEAN (R^2)}=0.52, indicating that it exceeds the cut-off value of 0.36 for large effect sizes of R^2. This result confirms that the PLS path model has better explaining power in comparison with the baseline values (GoF small=0.1, GoF medium=0.25, GoF large=0.36). It also provides adequate support to validate the PLS model globally (Wetzel et al., 2009).

6. DISCUSSION

The findings of this study confirm that physiological and psychological stresses act as an important predictor of job performance. In the context of this study, management has designed and determined challenging jobs for all employees in order to sustain and achieve its organizational strategy and goals. According to

the majority of respondents, the levels of physiological stress, psychological stress, and job performance are high. This situation explains that the ability of employees to appropriately manage, regulate and control physiological and psychological stresses in executing job may lead to an enhanced job performance in the organization.

This study provides three important implications: theoretical contribution, robustness of research methodology, and practical contribution. In terms of theoretical contribution, the results of this study confirm that workplace stress has been an important predictor of job performance in the studied organization. This result also has supported and extended studies by Cincotta (2005), Nabirye et al. (2011), Johnston et al. (2013), Kazi and Haslam (2013), and Farquharson et al. (2013). In regard with the robustness of research methodology, the survey questionnaires used in this study have met the acceptable standards of validity and reliability analyses, which may lead to the production of accurate and reliable research findings.

In terms of practical contributions, the findings of this study can be used as guidelines by practitioners to manage, regulate and control workplace stress problems in organizations. This objective may be achieved if management considers the following suggestions: firstly, management should require employees to attend stress management workshops in order to create awareness and enhance competencies in recognizing, using and managing stress. Secondly, management should involve employees in obtaining input in redesigning jobs that take into account stress potentials. Thirdly, organizational management may want to introduce a system of internal coaching and mentoring in order to motivate senior employees and supervisors to guide junior and inexperienced employees in planning and executing job. Proper emolument to senior employees should also be considered.

Fourth, organizational leadership should plan and implement regular work-life balance initiatives, such as sport and family day in order to reduce the intrusion of uncontrollable work problems in employees' private and family lives. Alternatively, a free or subsidized gymnasium annual membership should also be pro-

vided to employees. Finally, the management may desire to consider reminding its organizational members to return to methods approved by their respective religions that are believed to provide tranquility and relaxation. The last suggestion has the potential to provide 'value' to both employer and employees.

7. CONCLUSION

This study tested a conceptual framework based on the workplace stress research literature. The results of confirmatory factor analysis demonstrated that the instrument used in this study met the acceptable standards of validity and reliability analyses. The outcomes of SmartPLS path model analysis revealed that physiological and psychological stress were essential predictors of job performance in the studied organization. This finding has also supported and broadened the workplace stress studies mostly published in Western countries. Therefore, current research and practice within workplace stress needs to consider physiological and psychological stresses as crucial components of the workplace stress domain.

This study further suggests that the competency of employees to appropriately manage, regulate and control physiological and psychological stresses in executing job will strongly increase the ir positive attitudes and behavior (e.g. satisfaction, commitment, health and pro social behavior). Further, these positive individual outcomes may lead to sustainable organizational competitiveness in an increasingly global economy.

Despite the fact that the results of the current study find support from existing literature, future research should consider its limitations of conceptual framework and methodology. One of the limitations of the current study is relatively moderate response rate (66 percent). By selectively contacting the respondents who have not responded the study, the researchers will be able to learn about the reasons for non-response and form an opinion whether this group has been under-represented in the sample. Next, while the current model investigated relatedness among the contributors to employee health, they did not explain the degree of their respective contributions towards the dependent variable.

Future research in this area may be strengthened by ensuring that respondents are well represented in the sample. In fact, under-representation maybe overcome by approaching more similar institutions and appointing representatives to help remind colleagues to complete and submit their completed instrument. It is also feasible to make arrangement with the current organizations for longitudinal study. This approach will help confirm, among others, the reliability of results of the first and previous surveys. Using causal model would be the next logical step for correlations study. When this study has established valid statistical relationships among major variables, the latter qualify for testing on causality.

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