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Healthcare workers' stress and health behaviors: utilization of the stages of change model

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ABSTRACT

Most healthcare workers are not meeting the American heart association's recommended 150 minutes of physical activity. The purpose of this study was to examine the differences in healthcare workers' stress on their stages of distribution for physical activity using the stages of change model. A volunteer sample of 122 healthcare workers was asked to complete an online 3-page questionnaire measuring their perceived stress and stages of change distribution for their physical activity. The result revealed that there was a statistically significant difference between the level of stress and stage of change distribution for the recommended level of physical activity as determined by one way analysis of variance (ANOVA) F(4, 118)=3.36, p=.012.

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1. INTRODUCTION

Healthcare workers' stress levels are the highest among all US workers in non-government sectors [1]. Hospital staff, in particular, face copious occupational stressors, including exposures to biohazardous materials, heavy workloads, long and irregular working hours, physical burdens from patient handling, pressures to complete tasks on time, understaffing, and burnout [2]. When these occupational stressors are not well-managed, they may put healthcare workers at a higher risk for developing physical, psychological, and behavioral disorders [3].

The most common and costly work-related physical health problem that impacts healthcare workers related to the physical demands of their work is musculoskeletal pain in the neck, shoulders, and lower back [4]. The national institute for occupational safety and health (NIOSH) placed healthcare workers under an occupation requiring physical labor demands. In the research, a typical example of heavy back loading during patient handling has shown an increased risk of musculoskeletal injuries as well as increased lower back pain. Consequently, the world health organization (WHO) has called attention to these various occupational hazards, correlating musculoskeletal disorders to high sickness absence rates among nurses [5].

In a National Health article, Krisberg reported that healthcare workers exposed to high stress levels were twice as likely to develop psychosocial disorders, such as depression, suicide, and burnout [6], [7]. Of the various psychological health issues resulting from occupational stress, healthcare workers' burnout is of great concern not only because this can compromise the safety of patients but because it may lead to serious mental health issues, such as depression and suicide [8]. Burnout is an occupational condition categorized by

an employee's feelings of emotional exhaustion, lack of personal connection to colleagues and patients, and doubting professional abilities or impact [9]–[11]. During the past decade, burnout among healthcare workers gained interest from administrators in health care institutions and academic scholars due to the detrimental consequences that it can have both personally (i.e., substance abuse, broken relationships, and suicide) and professionally (i.e., lower patient satisfaction, impaired quality of care, and potential medical errors) [12]. However, healthcare workers' burnout in hospital settings is difficult to notice because of the health care field's unique environment in that high stress is perceived to be inherent to the profession. A study conducted by Mayo Clinic in 2015 revealed a 9% increase in job burnout between 2011 and 2014 among physicians, while other work groups remained stable [13].

Since the causes of healthcare workers' burnout are multifactorial, there is no consensus on what methods would be the most effective treatment. It is imperative to engage in health improving behaviors as a way to manage healthcare workers' burnout and to increase their overall well-being [14]. There is a notion that healthcare workers are knowledgeable on health topics, and therefore, they have a high adherence rate to health improving behaviors [15]. However, most healthcare workers were found to inconsistently practice the AHA's recommended physical activity. In a study of 303 physicians, Aggarwal and his colleagues found that only half of the physicians (52%) met the American Heart Association's physical activity recommendations, and only 56% consumed three servings of fruit and vegetables a day [16]. There was a similar finding from a cross-sectional study that measured 335 registered nurses' physical activity, sedentariness, and fruit/vegetable consumption, showing that most of the nurses did not meet the American Heart Association (AHA) physical activity recommendations, and only 47% consumed five or more servings of fruit and vegetables daily [17].

Any health-improving behavior that is not part of one's lifestyle could result, at best, in a transient impact on one's well-being; and thus, it is very important to measure healthcare workers' health-improving behaviors using evidence-based theories and models that would explain one's intentions and duration of one's engagement in health improving behaviors. According to the originators of the stages of change model, Prochaska and Diclemente, people who have been consistently engaged in health-improving behaviors for longer than six months would be highly likely to practice their health behaviors for the rest of life even when facing difficult stress events [18]. Despite the significant implications of the stages of change model, the majority of studies reporting healthcare workers' health behaviors are based on cross-sectional snapshots of health behaviors of healthcare workers, which do not provide insights into whether these health behaviors are consistent, nor do they provide information that could guide intervention programs to improve stress management and healthy exercise and eating practices.

Therefore, the purpose of the current study was to examine the differences in healthcare workers' stress on their stages of change distribution for physical activity using the stages of change model. By investigating healthcare workers' levels of physical activity according to the stages of change model, this study could explain the potential impact of physical activity engagement on healthcare workers' stress levels. More specifically, healthcare workers' stages of change distribution for their physical activity would be systematically categorized into five stages based on health care workers' readiness for and duration of their physical activity. In doing so, this would allow public health educators to design an effective stress-management program that is tailored toward healthcare workers' behavioral intentions and duration so that the motivations of healthcare workers' engagement in physical activity programs can be maximized; and in turn it could effectively reduce their stress.

Prochaska and Diclemente developed the transtheoretical model (TTM) in 1983, and it is also known as the "stages of change model". The TTM entails four core constructs: i) stages of change model, ii) processes of change, iii) decisional balance, and iv) self-efficacy [19]. According to the stages of change model there are five stages: i) pre-contemplation, ii) contemplation, iii) preparation, iv) action, and v) maintenance [20]. People in the pre-contemplation are generally not willing to change their behavior in the next six months. In contrast, people in the contemplation stage intend to change their behavior in the next six months and are aware that they have problem behaviors. Subsequently, people in the preparation stage are the ones who are willing to change their problem behavior and are preparing to take action within 30 days. People in the action stage are described as those who have been doing new behaviors for less than six months. The last stage is the maintenance stage, where people have been practicing their new behaviors for more than six months [21].

2. RESEARCH METHOD

An observational study examined the relationship between healthcare workers' exposure to work-related stress and their physical activity measured by the stages of change model. A total of 122 healthcare workers volunteered from a sample of 750 employees at a local hospital. The volunteer subjects were asked

to fill out a 3-page online survey during January 2019. Cohen's perceived stress scale (PSS) 10-item instrument was used to measure participants' stress levels, and the PSS 10-item score ranges from 0 to 40. In addition, Rossi's modified 8-item general health survey was used to measure participants' stages of change for their health-improving behaviors, including AHA's 150 minutes of recommended physical activity, 5-6 servings of daily fruit and vegetable intake, and stress reduction or each health behavior question, participants were asked to choose response options that are classified into five different stages of change distribution [22]. Below are the scoring instructions for the classification of the stages of change distribution. For example, "do you exercise three times a week for at least 50 minutes each time?" Scoring is as follows: Answer choice (A): Maintenance stage (Yes), I have been for more than six months), Answer choice (B): Action stage (Yes), I have been, but for less than six months), Answer choice (C): Preparation (NO), but I intend to in the next 30 days, Answer choice (D): Contemplation (NO), but intend to in the next six months), and Answer choice (E): Precontemplation (NO), and I do not intend to in the next six months).

3. RESULTS

3.1. Participants' demographics

Of the total of 122 participants, the majority were women (n=105; 86.1%) and 13.9% (n=17) were men. The participants were Caucasian and Hispanic/Latino predominately: 43.1% and 35.8%, respectively. The majority were between 50-59 years and 30-39 years: 26.8% and 24.4%, respectively. Table 1 depicts details of the participants' demographics.

Table 1. Participants' demographics (n=122)

Categories		f (%)
Gender	Male	17 (13.9)
	Female	105 (86.0)
Age	20-29	24 (19.6)
	30-39	30 (24.5)
	40-49	19 (15.6)
	50-59	33 (27.0)
	60+	16 (13.1)
Race	White	53 (43.1)
	Hispanic/Latino	44 (35.8)
	Asian	9 (7.3)
	Black	8 (6.5)
	Other	5 (4.1)
	Native Indian	4 (3.3)
Education	High school	18 (14.8)
	College	37 (30.3)
	Associate	44 (36.1)
	Bachelor's	12 (9.8)
	Graduate	11 (9.0)

3.2. Means of PSS scores by demographic factors

Cohen's PSS 10-item was used to investigate healthcare workers' perceived levels of stress. A Chronbach alpha was conducted to measure internal reliability for the PSS 10-item, and it had sufficiently high coefficients alpha to warrant consideration of them for further analysis. Although the PSS-10 is a summated stress score, there are no interpretation guidelines for the PSS scores because this scale measures the temporal events of individuals. Thus, the findings of this study's PSS-10 means were compared with one of the recent three national surveys conducted by the author of the PSS-10 in 2009 [23].

The PSS means of adults 25 years or older for this study were compared with the national 2009 eNation survey findings. There was a relatively higher PSS mean found in this study: M=21.01 vs. M=15.27. When reviewing the details of the PSS means across different age groups, it was noticed that the age group of 65 and older adults' PSS mean in this study was roughly two times higher than the 2009 e-National survey result. Additionally, the overall PSS means across the demographic factors in this study were also higher than the national survey findings. Table 2 depicts the comparisons of PSS means distribution between this study and the 2009 eNation survey. Since there is a large difference in the PSS means between the two studies, PSS mean differences of the demographic factors, including age, gender, and ethnicity were analyzed using t-tests and analysis of variance (ANOVA) to test for statistical differences. None of the demographic variables were found to be statistically significant for this study as shown in Table 2.

Table 2. Means of perceived stress score by demographic factors (gender, race, and age group)

Categories		This study M(SD)	2009 Study M(SD)
Gender	Male	21.0(3.7)	15.5(7.4)
	Female	20.0(2.4)	16.4(8/0)
Race	White	21.0(3.4)	15.7(7.5)
	Asian	23.0(3.6)	
	Black	19.9(7.8)	15.6(7.8)
	Hispanic	15.8(7.6)	17.0(7.4)
Age	25-34	20.7(3.8)	17.4(7.3)
	35-44	21.2(3.5)	16.3(7.0)
	45-54	21.2(4.7)	16.9(7.8)
	55-64	21.0(3.5)	14.5(7.2)
	65+	19.5(2.1)	11.0(6.7)

3.3. Mean differences of the PSS scores in the stages of change distribution for physical activity

The respondents' physical activity was classified into five stages of change distribution according to the premise of the stages of change model that individuals at different stages have different levels of readiness when it comes to experiencing ones' behavior change. Table 3 depicts mean differences of the PSS scores in the stages of change distribution for physical activity. With regard to participants' physical activity in the stages of change distribution, a one-way analysis of variance was conducted to analyze whether there was a difference between the participants' physical activity on their PSS scores. This result showed that there was a significant difference between the level of stress and stages of change distribution for the AHA's recommended level of physical activity: $F(4,116)=3.36$, $p=.012$. A Tukey post hoc test was executed to find out what stage of change distribution for physical activity was different on the PSS score, and it revealed that healthcare workers who were in the maintenance stage showed a significantly lower PSS score compared with that of other stages ($M=11.0$, $SD=6.7$).

Table 3. Mean differences of the PSS scores and the stages of change distribution for physical activity

Stages of change distribution		PSS score M(SD)	p-value
Physical activity	Pre-contemplation	19.2(6.1)	0.01
	Contemplation	19.5(8.0)	
	Preparation	16.0(6.4)	
	Action	15.1(8.4)	
	Maintenance	11.0(6.7)	

Note: PC: Pre-contemplation, C: Contemplation, P: Preparation, A: Action, M: Maintenance

3.4. Stepwise regression on the PSS among PSS score, vigorous physical activity, moderate physical activity, and low physical activity

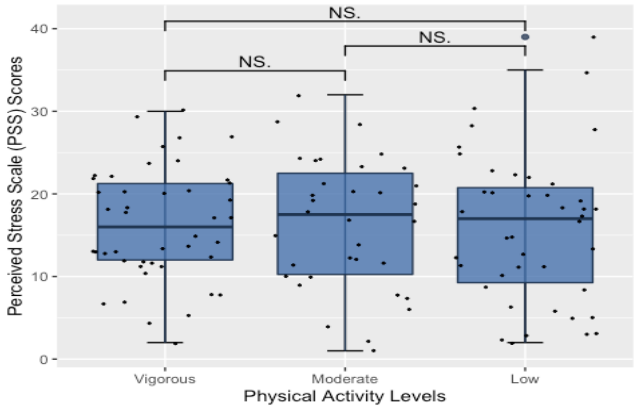
The stepwise regression results are reported in Table 4. The perceived stress scale (PSS)-10 was regressed on three independent variables, and the order of independent variables entered was i) vigorous physical activity, ii) Moderate physical activity, and iii) lower physical activity. A total of 4% of the variance was accounted for. The PSS-10 entered on step one accounted for 4% of the variance. In this analysis the minutes of moderate physical activity and the minutes of low physical activity were not significantly associated with the scores on the PSS. Although the minutes of vigorous physical activity were significant, this variable accounted for a minimal of 4% of the total explained variance.

Figure 1 shows the distribution of healthcare workers' perceived stress scores by their levels of physical activity. Analysis of variance (ANOVA) pairwise comparisons between vigorous, moderate, and low physical activity were found not to be significantly different in the PSS scores due to the various physical activity levels.

Table 4. Perceived stress scale regressed on healthcare workers' minutes of vigorous PA, moderate PA, and low PA

Step	Scale	R	AdjR^2	R^2 change	Partial R	p-value
1	Vigorous PA	0.222	0.041	0.049	-0.222	0.018
2	Moderate PA	0.222	0.032	0.000	-0.005	0.962
3	Low PA	0.062	0.036	0.012	-0.115	0.231

Statistically significant Sig.<0.05



Note: Not significant (NS)

Figure 1. Perceived stress scale (PSS) scores by healthcare workers' levels of physical activity

4. DISCUSSION

Overall, healthcare workers' PSS scores in this study were much higher than that of the 2009 national study. Such findings may be attributed to the fact that the nature of healthcare workers' occupational environment is inherently high in stress because of various occupation demands such as long and irregular hours, high expectations, and increased workloads [24], [25].

The stages of change model were utilized to examine whether or not healthcare workers' stages of change distribution for physical activity would make a difference on their perceived stress scores. The results demonstrated that healthcare workers' stages of change distribution for their levels of physical activity were closely related to their perceived stress scores. Specifically, healthcare workers who were in the action and maintenance stages for their physical activity reported to have much lower perceived stress scores than that of healthcare workers who were found in the preparation, contemplation and precontemplation stages. This finding is congruent with other research findings reporting positive effects of physical activity on mental health outcomes such as reducing perceived stress, lesser rates of depression, and reducing anxiety.

While there is no absolute PSS threshold score that indicates stress that might lead to a higher risk for developing chronic illnesses, the negative relationship between vigorous/moderate physical activity levels and perceived stress level has been widely reported [26], [27]. This study also found the statistically significant inverse association between healthcare workers' minutes of vigorous physical activities and perceived stress levels as shown in Table 4. However, whether there is a causal relationship between physical activity and perceived stress levels is unclear. According to ANOVA pairwise comparisons between vigorous, moderate, and low physical activity, there are no significant differences in the PSS scores due to the different physical activity levels as presented in Figure 1. It could indicate that self-reported physical activity levels were inaccurate, particularly for physical activities of moderate and low intensities [28]–[30]. Given the link between vigorous physical activity minutes and perceived stress levels, further studies to devise strategies to predict perceived stress levels associated with the minutes of healthcare workers' physical activity levels should be considered. The association could be a consequence of the increased working time during the pandemic. Further studies are needed to explore the underlying mechanisms between vigorous physical activity and perceived stress levels.

5. CONCLUSION

The healthcare workers' perceived stress levels were found to be much higher than that of the national PSS scores across the demographic factors. A regular engagement in physical activity was found to lower healthcare workers' perceived stress. More specifically, healthcare workers who have been consistently engaged in physical activity for longer than six months, that is 'maintenance stage', revealed the lowest PSS score compared to other healthcare workers who were in the action, preparation, contemplation, and pre-contemplation stage. Cohens' PSS is a reliable instrument measuring perceived stressors that are personal life events; however, it is not intended to measure stressful events at workplaces. Thus, future research will be needed to examine healthcare workers' stressors that are specific to their job settings, including job content and demands, physical environment, organization culture, relationships at work, lack of support, and role conflict.

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