Mindfulness Endorses Healthcare Perspective by Business Management: An Empirical Study of an Employee

Yu-Hung Tung and Jui-Chien Hsieh

***Abstract*—Stressful work has adverse effects on health, employees' health conditions are closely related to their work efficiency, healthcare is important for employees, health promotion is an important part of business management. Mindfulness is positively correlated to health; employees can do 15-minute mindfulness meditation easily in workplace. The purpose of this study is to explore the possibility of using 15-minute mindfulness meditation to improve employees' healthcare in working environment. In this study, when employees do 15-minute mindfulness meditation during break time in their workplace, we record their feeling before and after 15-minute mindfulness meditation and record their heart rate before and when doing mindfulness meditation via wearable heart rate device. Series data are analyzed with quantitative and qualitative methods. The study results show that comparing the heart rate before 15-minute mindfulness meditation, we can find that the heart rate significantly decreases when doing mindfulness meditation. We also find the advantage of doing 15-minute mindfulness meditation such as feeling more comfortable, improving headache and mood, reducing fatigue and stress. In conclusions, we can observe that doing 15-minute mindfulness meditation may help to enhance parasympathetic function with decreasing heart rate and improving employee well-being in workplace. Promoting 15-minute mindfulness meditation in workplace is help for both employee and business management, using wearable heart rate device may help for monitoring the heart rate and stress variation.**

***Index Terms*—Business management, healthcare, heart rate, 15-minute mindfulness meditation.**

I. Introduction

In General, excessive stress in workplace always takes a toll on employees' productivity, performance and both their physical and mental health, so employers must take care of their employees' health management and improve their ability to adapt the stress, so that enterprises can sustainable development [1]. Mindfulness-based interventions (MBIs) have been shown to play a positive role in reducing stress, relieving anxiety, preventing depression and improving the quality of life of healthy individuals [2], and it also applies to stress related chronic pain such as interstitial cystitis, bladder pain syndrome and low back pain [3], [4].

Many studies have provided the evidence of stress reduction after eight-week mindfulness course, but there was no statement of implications for practices [5].

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Autonomic nervous system (ANS) includes sympathetic system (SNS) and parasympathetic nervous system (PNS). SNS is excited under stress and accelerates the heart rate; conversely, PNS can make the heart rate slow down when relaxing from stress. Many studies results supported that mindfulness had positive effects on ANS. The results showed that mindfulness practices could increase high frequency power (HF), and lower HF is related stress condition [6], increased HF is positively correlated with well-being and negatively correlated with depression and anxiety [7]. Theoretically, HF represents the function of the PNS, so we can think that mindfulness may enhance PNS function, improved PNS function may help for decreasing heart rate to achieve more desirable level.

Work pressure is a source of stress, workplace is a stressful environment, resting is a traditional method for relaxation in workplace. Mindfulness is an effective method to releasing stress, doing 15-minute mindfulness meditation may be a better alternative way to releasing workplace stress.

In this study, we try to using 15-minute mindfulness meditation during break time in workplace to releasing workplace stress. We use a wearable heart rate monitor to record the heart rate of a healthy employee in break time before and when doing 15-minute mindfulness meditation, and then analysis the heart rate record to find out if an easily approached mindfulness exercises can reduce the heart rate and to achieve the goal.

The research questions to be explored in this study are:

1. What is the heart rate mean and standard deviation before and when practicing 15-minute mindfulness meditation?

2. Is there a correlation between heart rate before and when doing mindfulness meditation?

II. Literature Review

A. Mindfulness and 15-Minute Mindfulness Meditation

Mindfulness has become a popular keyword related to reducing stress and improving well-being, it was founded by Prof. Jon Kabat-Zinn since 1979. Mindfulness-based stress reduction (MBSR) and mindfulness-based cognitive therapy (MBCT) are two well-known courses that have standardized eight-week training courses. Mindfulness is the current method of open-minded and friendly willingness to understand what is happening around you, that is, living in the present and different from thinking about the present, not judging or neglecting anything or being taken away by the pressure of everyday life, it is also the practice of understanding your body, mind and feelings, and thinking of

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creating a feeling of calm.

Everyone can do mindfulness practices in daily life including in working environment or at home. Daily mindfulness spends few minutes to near one hour for each exercise. A ten to fifteen-minute practice is suitable in workplace or at home.

Many studies were designed to studies the mindfulness effects with comparing the difference pre and post six to eight-week traditional training program. Only few studies showed the effects with short time mindfulness practices.

Klatt *et al*. (2009) designed a RCT study to evaluate shortened MBSR training for work-site individuals, they used 20-minute MBSR in their training course, used questionnaires as evaluation method which including self-reported stress, sleep quality and mindfulness. After 6-week intervention, they found that compared with wait-list, individuals who received MBSR-ld (low dose) intervention had significantly statistic difference with reducing in stress, increasing in mindfulness and improving in sleep quality, here was no change in both groups of the salivary cortisol level [8].

Roeser *et al*. (2013) designed a study to reduce teacher's stress and burnout using home practices mindfulness training. In their study, the mean practice time of daily home mindfulness was fifteen to sixteen minutes per day for continuous eight weeks, two thirds of mindfulness participants who do not drop out showed compliance with the training program, and the results showed that fifteen to sixteen minutes home mindfulness was helpful reducing stress and burnout [9].

The studies results showed that the fifteen to twenty minutes mindfulness practices were efficiency and feasibility. It is lacking of study to evaluate the effects of mindfulness practices when doing during break time in workplace.

B. Heart Rate and Mindfulness

Heart rate is mean the number of heartbeat per minute, it is regulated under autonomic nervous system (ANS), a normal resting heart rate for health adult is from 60 to 100 per minute. Heartbeat can be accelerated under SNS dominance; it can be slow down when PNS dominance.

Higher heart rate is related with higher stress level. Barnes *et al*. (2007) designed a study to search for the relationship between heart rate and stress level in adolescents, the results showed that compared with low stress adolescents, high stress adolescents reported with higher mean HR with statistically significant difference [10]. Knight and Rickard (2001) designed a study to use relaxing music for preventing stress-induced condition, the results showed that stressor can significantly increase heart rate and relaxing music can prevent the induced heart rate change [11].

MBIs were reported its impacts on autonomic nervous system with reduced sympathetic activity and increased parasympathetic activity, and higher HF level was positively correlated with well-being, higher LF level was positively correlated with depression and anxiety [6], [7]. Theoretically, mindfulness can influence the change of HR. In the study of Carlson *et al*. (2007), the HR change was reported positively related to self-report stress level, elevated resting HR was related to high stress level or more symptoms of mood disturbance [12].

So for healthy people, even heart rate is within normal limited, it still changes with stress condition. Resting HR is higher with higher stress level, and it can decrease with mindfulness or other relaxing method such as relaxing music.

C. Enterprise Healthcare Management

Some studies focus on the correlation between emotional intelligence (EI) and workplace stress. The results showed that EI is negatively correlated with workplace stress, and positively correlation with organizational commitment, the employees having the higher score of EI were related to less stress in a same occupational environment. The study results also supported the EI as a determinant of organizational loyalty [13]. Burnout is a syndrome caused by chronic workplace stress which is negatively correlated with employees' well-being. Burnout is a significant predictor of physical consequences such as fatigue, chronic pain, metabolic syndrome and cardiovascular disease, *et al*. with middle-aged employees. It is also related to psychological disorders such as insomnia, depressive syndrome and medication psychological ill-health symptoms *et al*. [14], [15]. Obviously, the higher workplace stress level, the higher the job burnout rate with pal fatigue score and chronic disease incidence rate [15]. Overall, employers need pay attention to the status of workplace stress on employees, emphasize the demand of preventive intervention.

According to the above research, we can know that the excessive workplace pressure and employees in unhealthy physical and mental condition were negatively correlated with enterprise's performance. Reducing stress and improving stress adaptive capability of employees are important for business management; it can have significant benefits on both employees and organizational effectiveness.

D. Mindfulness Impacts on Performance and Workplace Stress

To studies the impacts of mindfulness on performance, Mrazek *et al*. (2013) designed a RCT study on stressed graduated students, in this study, two-week mindfulness training course was arranged with these graduate students who had stress to pass GRE test, the results showed that after two-week mindfulness training, the students could reduce their mind wandering and improve their performance such as increasing the GRE score and improving working memory capacity [16]. In the study designed by Shao and Skarlicki, the results also supported that the person who having higher mindfulness was positively associated with higher performance [17].

For many enterprises, mindfulness program had been arranged as one of goals of business management. The positive effects of mindfulness training on employees have been well documented such as decreasing stress level, improving wellness, improving building resilience, enhancing engagement and reducing burnout *et al*., on the other hand, enterprises also can get benefits such as increasing performance, decreasing turnover intervention and reducing workplace stress cost [18].

Shorten the mindfulness training program and short time mindfulness practices were proposed for easier implementing in workplace [18].

E. Wearable Heart Rate Monitor

There are many kinds of well-developed heart rate monitor, wearable heart rate monitor were also developed quickly in recent years. The commercial products had been widely used in daily life and gyms for recording heart rate and monitoring healthy condition.

Polar series heart rate monitors have been developed for many years, many study results provided evidence of its validity when compared with standard EKG. Polar H7 Bluetooth smart chest transmitter is an easily used heart rate monitor. Cheatham *et al*. (2015) studied on the function of Polar H7, comparing with traditional pulse oximeter, the results showed that the heart rate recording of Polar H7 was as good as traditional pulse oximeter in supine, sitting and standing position [19]. Plews *et al*. (2017) designed a study to compare the function of Polar H7 with EKG when used on athletes; the results showed that the data from polar H7 were well correlated with EKG [20].

We select Polar H7 in our study as HR monitor, and design an APP to retrieval the heart rate data.

III. Methodology

A. Research Design and Sample Data Collection

In this study, we collected the heart rate data of a healthy employee before and on 15-minute mindfulness meditation in workplace during break time. The fifteen-minute mindfulness meditation included mindfulness breathing and body scan, the heart rate data recorded via Polar H7. The heart rate data were transferred from the wearable devices depending on a designed APP. During 4 months period, we collected data for 30 days. The Process of collecting heart rate data was shown in Fig. 1.

The heart rate information before the mindfulness is recorded about fifteen minutes before beginning the mindfulness meditation. The heart rate information on practicing mindfulness is recorded when doing the fifteen-minute mindfulness meditation.

The employee wrote down the feeling of healthy condition before and after the 15-minute mindfulness meditation in text.

This study was approved by the Research Ethics Committee of New Taipei City Hospital, New Taipei City, Taiwan, with an approval code of REC NTPC No.: 106002-E.

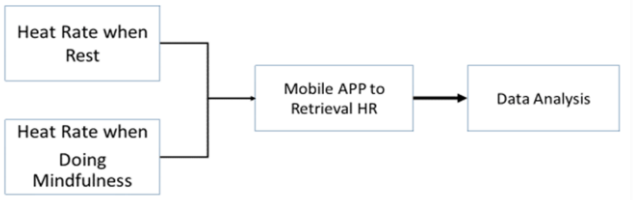

Fig. 1. Process of data collection.

B. Data Analysis

Heart rate data were analyzed using Mean and SD of recoded HR before and on the mindfulness meditation. SPSS 20.0 was used for statistical analysis, and the Pearson Correlation statistics method to understand whether the mindfulness is related.

In terms of qualitative information, physical condition was recorded in text record before and after mindfulness practices, the pressure of employee was evaluated from the text record. And based on the recording, the results were obtained through the inductive analysis by the independent person.

C. Reliability and Validity Analysis

In Table I and Table II, we represent the reliability analysis of this study, the Cronbach's Alpha value is 0.870, it represents the reliability of the study sample.

TABLE I: Observation Value Processing Summary

		N	%
Observation value	Effective	30	46.9
	Exclude	34	53.1
	Total	64	100.0

TABLE II: Reliability Statistics

Cronbach's Alpha value	Number of items
0.870	2

In Table III and Table IV, we represent the validity of the sample, the KMO value is 0.500 (significance value .000), but the cumulative variation amount to 88.56% represents the validity of this study.

TABLE III: KMO and Bartlett Test

Kaiser-Meyer-Olkin sampling the appropriate amount of measure		0.500
Bartlett's spherical check	Approximate chi-square allocation	24.848
	df	1
	Significance	0.000

TABLE IV: Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	Variance	Cumulative	Total	Variance	Cumulative
1	1.77	88.56%	88.56%	1.77	88.56%	88.56%
2	0.23	11.44%	100.00%			

IV. Results

A. Descriptive Statistics

The mean and SD of HR pre and on mindfulness are listed on Table V. On practicing mindfulness, we find that the mean and SD of HR decrease compared with pre mindfulness data. Pre mindfulness mean of HR is 77.99bpm, SD of HR is 5.26; on practicing mindfulness, the mean of HR is 71.35bpm, SD of HR is 4.92. The result is shown in Table VI. When doing 15-miute mindfulness practice during break time, the employee can get lower mean heart rate with lower variability of HR comparing traditional resting.

The results of paired t-test of 30 days heart rate pre and on mindfulness are shown in Table VII. Compared with pre mindfulness condition, the mean of HR decreases 6.64bpm when doing 15-minute mindfulness meditation, and the result has statistically significant difference, 95% CI is 5.35-7.93 bpm.

TABLE V: HR AND SD PRE AND ON MINDFULNESS

	Mean of HR(bpm)		SD of HR	
	mindfulness		mindfulness	
No.	Pre	on	Pre	on
1	75.0	70.1	5.3	4.9
2	87.9	81.6	5.4	4.9
3	81.1	73.6	3.4	4.7
4	82.0	69.8	4.7	4.7
5	82.3	70.6	5.7	4.1
6	81.2	75.2	4.9	4.9
7	74.3	65.8	5.6	3.7
8	86.5	75.5	5.2	2.7
9	89.5	86.0	6.8	3.0
10	70.8	73.8	5.1	2.6
11	72.0	65.3	5.6	5.1
12	75.6	67.2	6.7	4.5
13	76.0	67.2	5.7	2.9
14	75.8	68.1	5.2	3.6
15	78.5	72.9	3.8	4.2
16	79.8	67.4	11.4	3.8
17	83.4	77.1	3.6	5.5
18	79.9	74.5	4.4	3.5
19	79.0	66.7	5.8	3.7
20	71.4	65.6	5.3	2.7
21	77.1	71.4	4.3	3.2
22	72.8	64.4	6.0	3.5
23	70.5	67.6	3.6	3.7
24	82.4	75.8	5.2	5.0
25	74.9	71.9	5.5	2.5
26	77.3	71.7	10.8	4.3
27	74.1	68.8	4.9	5.4
28	82.7	73.9	4.4	2.7
29	68.6	68.3	4.1	4.1
30	77.4	72.8	4.6	3.7

TABLE VI: HEART RATE MEAN AND SD

	HR	
	Mean	SD
Heart rate pre-mindfulness	77.99	5.26
Heart rate on practicing mindfulness	71.35	4.92

TABLE VII: PAIRED T-TEST OF HR

	Mean	95% CI mean		SD	95% CI SD		P-value
		low	up		low	up	
HR	6.64	5.35	7.93	3.46	2.75	4.65	<.0001

The heart rate data pre and on doing mindfulness were shown in Fig. 2. The heart rates before and when doing mindfulness are all within normal limited, most of the heart rates with mindfulness are lower when compared before mindfulness, it can be known that mindfulness helps to reduce heart rate.

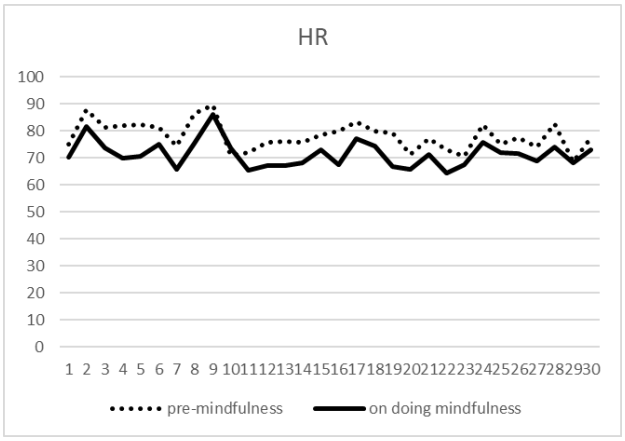

Fig. 2. Heart rate chart pre-and when doing mindfulness.

B. Analysis of Mindfulness and Heart Rate

Using Pearson's correlation to analyze the heart rate before and on doing the 15-minute mindfulness, the result is shown in Table VIII. The statistical results show that HR before and on doing the mindfulness is significantly correlated with mindfulness.

TABLE VIII: MINDFULNESS CORRELATIONS

		Pre-mindfulness	mindfulness
Pre-mindfulness	Pearson Correlation	1	.771**
	Sig. (2-tailed)		.000
	Sum of squares	802.379	579.031
	Covariance	27.668	19.967
	N	30	30
mindfulness	Pearson Correlation	.771**	1
	Sig. (2-tailed)	.000	
	Sum of squares	579.031	702.415
	Covariance	19.967	24.221
	N	30	30

**. When the significant level is 0.01 (two-tailed), the correlation is significant.

C. Analysis of Qualitative data

The qualitative information from the text recording before and after the mindfulness exercise was analyzed by the independent person. The series text records include the thoughts, self-reported stress, feelings of fatigue, headache and backache etc. before and after the practice.

Summarizing the series text records, the advantage of mindfulness includes that feeling more comfortable, improving headaches and mood, reducing fatigue and stress after 15-minute mindfulness meditation.

V. Conclusion

A. Conclusion and Discussion

According to the research results, the conclusions of this study are as follows:

1. Mindfulness helps heart rate decrease

Comparing HR before mindfulness which represent as traditional rest condition, the mean heart rate and standard deviation are reduced with mindfulness, the heart rate changes before and on doing the mindfulness are shown in Fig. 2.

All of the heart rates pre and on doing the mindfulness are within normal range. It means that you may not identify the heart rate difference between pre and on doing the mindfulness if without heart rate record. But depending on a wearable commercial heart rate monitor with data retrieval and analysis technology, we can recognize the slight but steady change when doing the daily mindfulness.

The change of base line HR may represent the different daily stress condition. The decreased HR on each time is not exactly the same, the reason cannot explain in our study.

2. Heart rate before and on doing mindfulness is related

Human heart rate changes according to mood and physical condition. Studies have shown that mindfulness can effectively reduce heart rate and relax employees' mood.

According to studies, mindfulness is positively correlated with decreased heart rate which related increased activity of parasympathetic nervous system.

3. Mindfulness helps reducing stress

The pressure of employees is everywhere including workplace pressure, life stress and so on. Analyzed the text record pre and after the mindfulness, we can find that even a short time mindfulness, it can help the employee to fell well in daily stressed working environment compared with traditional rest.

B. Management Implications

From the perspective of business management, enterprises can promote healthcare through mindfulness, 1. Improve the pressure adjustment of employees, 2. Improve the workplace atmosphere. Improving the above problems, it can directly increase the competitiveness of enterprises. And 15-minute mindfulness meditation is an acceptable form in workplace. So that employees can use "mindfulness" to achieve self-improvement, and on the other hand, it is a scheme to increase the productivity of the work.

Heart rate is an easily obtained biophysical data; it can be a useful biomarker in health promotion management for employee alone or in the enterprises.

C. Future Research Recommendations

Although this study is a comprehensive research, we use both quantitative and qualitative research method. However, only long-term data of an employee can be collected on a case-by-case basis. Future research proposals can be quantified by adding sample methods to make research inferences more reliable.

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