

**Investigation of Cardio-Respiratory Fitness, Stress and Body Mass Index of Public Employees regarding Working Partnership**<sup>1</sup>Ali Reza Khademi, <sup>2</sup>Mahbanoo Ghaderi, <sup>3</sup>Mohammad Ali Samavat Shareif, <sup>4</sup>Mehrdad Pouya<sup>1,2</sup>Dept. of Physical Education and Sport Sciences, Nahavand Higher Education Complex, Bu-Ali Sina University, Hamedan, Iran<sup>3</sup>Dept. of Physical Education and Sport Sciences, Bu-Ali Sina University, Hamedan, Iran<sup>4</sup>Head of Extension Education Dept., Nahavand Higher Education Complex, Bu-Ali Sina University, Hamedan, Iran

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Investigation of Cardio-Respiratory Fitness, Stress and Body Mass Index of Public Employees  
Regarding Working Partnership.

**ABSTRACT**

The main purpose of this enquiry was to investigate cardio-respiratory fitness, stress, and body mass index of Nahavand public employees regarding their working partnership. After a call of Nahavand public offices, 52 employees out of access population and after screening for particular disease participated in the study. To evaluate cardio-respiratory fitness, stress, body mass index, and working partnership Rakpurt's one-mile walk test, Team Hyndle questionnaire, weight divided by squared height, and Lodhal and Kenjer questionnaire were utilized as research indices; respectively. Before any testing, respondents' physical health was checked and we made sure of no interfering disease. For statistical analysis, SPSS software with Pearson correlation method was employed. Results showed that public employees of Nahavand organizations were healthy in terms of stress, and body mass index while in poor shape regarding cardio-respiratory fitness. A significant and positive correlation ( $r = 0.852$ ) was discovered between working partnership and cardio-respiratory fitness; while its correlation with stress and body mass index was revealed to be significant but negative at  $-0.449$  and  $-0.533$ ; in that order. To promote working partnership and organizational productivity of public employees, it is recommended that their access to physical education, sport and recreational activities get facilitated and accentuated.

**Key words:** cardio-respiratory fitness, stress, body mass index, working partnership.

**Introduction**

Sport is regarded as an educational tool nowadays. In Iran, percentage of younger population and their positive attitudes towards exercise is growing. Sharifi [20] describes main goals of sports and physical activities as: (a) preventing diseases caused by a sedentary lifestyle such as heart malfunction, hypertension, diabetes, obesity, osteoporosis and the like; (b) developing individuals' level of physical capabilities; and (c) improving feeling of vitality by reducing mental stress.

Adults with multiple risk factors for disease (e.g., high blood pressure, smoking, and sedentary habits) are more likely to be high-cost employees in terms of healthcare use, absenteeism, disability, and overall productivity.<sup>2</sup> On the other hand, healthy employees—and especially those with healthy families, as well—are likely to incur lower medical costs and be more productive [9].

Workplace health promotion, as one of the most important aspects of business development, has shifted to human resources' physical and mental health development in educational, industrial and other institutions of our world today [13]. Exercise and physical activity is considered as a means of promoting physical health and revitalizing professional performance of employees by enhancing level of active participation in the work [1].

Physical and mental health of individuals is a key and strategic issue of modern societies. That of an organization is determined by its employees and immediately brings its fruits by affecting productivity levels of the organization. A healthy body means a healthy mind. To encourage the community to increase their exercise necessitates strengthening of social and cultural foundations. In organizations, physical activities of employees brings about effective work partnership and job satisfaction which are two important factors of increasing organizational effectiveness [6]. In this regard,

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promotion of sports at various levels of public institutions is essential for the government.

Cardiovascular capability as the main contributing factor to physical fitness indicates circulatory and respiratory efficiency i.e. – level of oxygen delivery to muscle tissues or maximum oxygen uptake (Vo<sub>2</sub> max) of active tissues [18]. Smith *et al* [21] reported that those with poor cardiovascular fitness compared to healthier ones were more likely to develop depression and stress. Malyk *et al* [11] while studying mental disorders, such as anxiety and depression, amongst 963 patients with cardiovascular disease discovered that almost a quarter of them were suffering from mental illnesses. However, Sorensen *et al* [22] reported that 70% of people who participated in aerobic exercises reported less anxiety and more confidence compared to those with inactive lifestyle.

Occupational stress from the viewpoint of Maslach [12] is a psychological response against work pressure, and is determined by fatigue, lower efficiency and poor performance of the individual. Mohammadi [13] showed that frequency and severity of depression components were less frequent in athletic employees than non-athletes. Effective reduction of occupational stress is associated with cardio-respiratory fitness and depression [12]. Occupational stress can also lead to increased absenteeism or leave of the workplace, and reduced quality of providing organizational services. Lindsay [9] while investigating the relationship between job stress and Health Promotion Objectives found a relationship between job-related stress and mental health.

While obesity is increasing, especially amongst public employees, it dictates the study of its prevalence and relationship with lifestyle towards finding a solution and improving the performance of public employees. Although technology has facilitated our life and career, an inactive lifestyle is threatening our professional lifestyle [19]. Ourangi [16] lists various issues as the inhibitors of participating in physical activities namely lack of time or motivation and work-induced fatigue. Sharifi *et al* [20] found a significant negative relationship between level of physical activity and body mass index (BMI). In this study, 95% of employees were using private or public vehicles to commute revealing a significant correlation between how to commute to place of work with BMI and percent of body fat.

The main purpose of this study was to investigate the relationship between cardio-respiratory fitness, body mass index and stress when working in partnership; as the main contributing factors to efficiency and effectiveness of public employees.

## Methods And Materials

The participants of this study were 52 volunteer employees of Nahavand public offices out of the access population (N=125) that were allowed to be tested after being screened for particular diseases. Rockport's one-mile walk test was employed to estimate the cardio-respiratory fitness [15]. Participants were asked to walk up to 1,609 meters on the treadmill as fast as they could. Immediately and at the end of the exercise, heart rate of the volunteer was read. The following formula was used to estimate the VO<sub>2</sub>max (eq. 1).

$$(1) \text{VO}_{2\text{max}} \text{ ml} \cdot \text{kg}^{-1} \cdot \text{min}^{-1} = 132.853 - 0.0769 \times \text{weight} - 0.3387 \times \text{age} + 6.315 \times \text{gender} - 3.2469 \times \text{time of the walk} - 0.1565 \times \text{Heart rate}$$

Team Hindle Questionnaire ( $r = 0.74$ ) was used to measure stress [5]. The questionnaire includes 32 questions with four options. When summation of points ranges between 64-32, it represents an optimal level of stress which is well controlled. Scores of 95-65 indicate that the stress level is reasonable, but in certain areas need to be controlled. Scores of 128-96 show high levels of stress that need to be reduced. Height in cm over Weight in kg was used as the formula for estimating body mass index (BMI). BMIs ranging from 20-24.9, 25-29.9, 30-40 and over 40 are considered normal, class-1 overweight, class-2 overweight and obese; respectively [15]. For the measurement of working partnership levels of Lodahl and Kenjer's questionnaire was utilized [10]. The questionnaire contains 20 items each comprising 5 levels. To collate the instrument, items numbered 10, 13, 14, 16, 18 and 19 are scored from 0 to 4 in a Lykert-type scale; while items 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 15, 17 and 20 are scored from 4-0 meaning 4,3,2 and 1 stand for strongly agree, agree, disagree, and strongly disagree; correspondingly. If total score of the respondent summed more than 40, it shows the individual's high job involvement. The highest job involvement's is when the score approaches 80.

SPSS software with Pearson correlation coefficient was applied accompanied by indicators of central tendency. Tables were sketched using Excel software.

## Findings:

Table 1 describes height, weight, age, stress, BMI, VO<sub>2</sub>max and working partnership of Nahavand public bureaucracy.

Table 2 reveals the correlation coefficients which were found between the working partnership in one side and VO<sub>2</sub>max, stress and body mass index from the other.

Table 3 shows correlation between VO<sub>2</sub>max and stress variables and body mass index.

**Table 1:** Mean of height, weight, age, BMI, stress, VO<sub>2</sub>max and working partnership (n=52).

Variables	Mean
Age	5.14 ± 29.71
Height	0.10 ± 1.7
Weight	15.38 ± 74.40
Stress	9.27 ± 58.91
Body Mass Index	3.85 ± 24.98
Partnership Working	6.84 ± 53.28
VO <sub>2</sub> max	8.06 ± 48.00

**Table 2:** Relationship between working partnership and VO<sub>2</sub>max, stress and body mass index (n=52).

Partnership Working		VO <sub>2</sub> max	Stress	Body mass index
	Pearson correlation coefficient	*0.852	*-0.449	*-0.553
P	0.000	0.001	0.000	

\*P &lt; 0.05.

**Table 3:** Relationship between VO<sub>2</sub>max with BMI and stress (n=52).

VO <sub>2</sub> max		Stress	Body mass index
	Pearson correlation coefficient	*-0.417	*-0.608
P	0.002	0.000	

\* P &lt; 0.05.

**Table 4:** Relationship between body mass index and stress (n=52).

Body mass index		Stress
	Pearson correlation coefficient	*-0.324
P	0.019	

\* P &lt; 0.05.

Table 4 illustrates correlation between body mass index and stress within employees of Nahavand public offices.

#### Discussion:

The results of this study showed public employees participating in the study were relatively O.K in terms of stress level ( $9.278 \pm 58.913$ ) as 61.29 percent of employees showed reasonable and 38.71 percent high levels of stress. Many of them did not use their private vehicles to commute to work and more than 60 percent of them participated in sports such as indoor soccer and swimming. Research conducted by Pennebaker *et al* [17] showed that people who did jogging (running slow) were protected from mental and physical illnesses and physical fatigue. Since most participants of this research preferred walking to work, results of this study in terms of type of physical activity was consistent with Pennebaker *et al* [17].

BMI is one of the most important factors determining the optimal weight and surplus body fat. The mean BMI of Nahavand employees was calculated to be  $24.985 \pm 3.850$  which fell in the range of desirable norms. Desirable BMI of employees could be linked to doing sports and physical activities such as soccer, athletics, cycling, swimming and resistance training. People who had high BMI with obesity grade 1 and 2 proved to be over 40 years of age. In the 40 years of age, almost two-thirds to four fifths of men and women are either overweight or obese. According to the results of this

study, the direct relationship between weight gains with age was consistent.

VO<sub>2</sub>max on average was  $48.0087 \pm 8.066$ . It shows weak level of cardio-respiratory fitness amongst Nahavand public employees. While relatively high level of participation in various sporting activities could be mentioned as one reason of reducing stress; its effect on cardio-respiratory fitness was not significant. It might be due to low intensity or frequency and duration of exercise. VO<sub>2</sub>max is promoted with maximum and regular aerobic exercise, or at least lasting for three months [20]. Study of rate of working partnership with maximal oxygen consumption in Nahavand offices showed that working partnership was high while VO<sub>2</sub>max was too weak.

Average working partnership was  $53.28 \pm 6.84$  which was relatively high. The minimum and maximum rate of employees' working partnership were 50 and 70; respectively, indicating a high level of working partnership amongst Nahavand public bureaucracy.

The results of this study also indicated that there was a significant and direct relationship between cardio-respiratory fitness and working partnership ( $r = 0.852$ ). The results of this study were consistent with Maslach [12]. He showed that reduction of effectiveness in organizations was associated with physical weakness and lack of cardio-respiratory fitness [12]. As mentioned earlier, occupational stress was one of the most important factors in reducing effective work partnership. One of the effects of cardiopulmonary fitness is self confidence and its effect on the psychological health. People

with poor physical vigor usually suffer from stress sooner rather than later. They also have low level of self confidence. This could have negative impact on their level of working partnership [13].

The results also indicated that there was a significant inverse relationship between working partnership and stress ( $r = 0.449$ ). Levels of stress and working partnership were observed to be in range of moderate to high. Cheng *et al* stated that there was a significant relationship between job performance and stress. Anxious individuals with high level of stress showed lower concentration harmful to the performance of themselves and organizations.

There were a significant inverse relationship between working partnership and body mass index ( $r = 0.533$ ) as well. According to the discovery of a significant relationship between working partnership and body mass index, BMI can be introduced as a desirable tool to monitor and increase working partnership and performance of personnel. Desirable level of BMI in employees can be due to their active lifestyle and not using personal or public transportation. Sharifi [20] believes that a person's level of physical activity declines with age, causing weight gain, obesity, and low levels of cardio-respiratory fitness. With lower levels of physical fitness, ability to concentrate can be reduced; therefore, employee's mental and psychological involvement in their job is threatened. Result of Sharifi [20] was consistent with the present study.

In the present study, a significant inverse relationship was found between cardio-respiratory fitness and stress ( $r=-0.417$ ) or BMI ( $r=-0.608$ ) showing that cardio-respiratory fitness was associated with reduced stress and high BMI. Kavano [7] showed that clients in stressful workplace had lower cardiovascular health. Nevertheless, reducing stress inducing factors in the workplace can improve employees' physical and mental health [20]. Dekkers *et al* [4] in a relatively large study on 1015 men 21-51 years of age found that cardio-respiratory fitness significantly correlated with BMI in this range of age. Our study indicated that 60% of employees who performed physical activity on a weekly bases demonstrated optimal working partnership plus cardio-respiratory fitness delineating that effects of exercise on working partnership, stress and body mass index differed from their effect on VO<sub>2</sub>max.

The relationship between stress and body mass index was a significant direct correlation ( $r = 0.324$ ). Stress causes body resistance to insulin (a hormone that regulates blood sugar). It then increases level of blood sugar and as there are no muscle cells to consume it, in form of lipid, it is accumulated in fatty tissue [1]. Kouveonen *et al* [8] research on stress at work was consistent with our results. According to our study active lifestyle as the sub-maximum activity (swimming, indoor soccer, walking, and so

on) has a positive effect on stress, work partnership and BMI, independent of VO<sub>2</sub>max.

## References

1. Azizi, F., 2000. Tehran Lipid and Glucose Study, Research Center for Endocrinology and Metabolism, Medical Sciences and Health Services of Beheshti University, 121: 67-86 (in Persian).
2. Bompa, T.G. and G. Haff, 2009. Theory and Methodology of Training. York university, Human Kenetics, 5: 80-120.
3. Ping, C. and F. Jiu, 2010. Relation ship among traditional Chinese personality traita, workers in the semiconductor industry in Taiwan. Chang Quality & Quantity, 4: 733-748.
4. Dekkers, J., F. Marieke and V. Wier, 2011. Comparative effectiveness of lifestyle interrention on cardiovascular risk factors. BMC public Healht., 1: 49-55.
5. Hindle, T. and M. Kerwin, 2009. Manage Your Time. Dorling Kindersley, 1: 105-111.
6. Hutchings, K., 2011. Employee Attraction and Retention in the Australian Resources Sector. Journal of industrial relations, 53: 1 83-101.
7. Kawano, Y., 2008. Association of job- related factors with psychological and somatic symptom amongs Japanese hospital nurses. J Occup Health., 50: 79-85.
8. Kouvonon, A., M. Kivimaki, J. Cox, S. and J. Vahter, 2005. Relationship between work stress and body mass index among female and male employees. Psychosomatic Medicine., 67: 577-583.
9. Lindsay, G.M., 2010. Healthy People: Health Promotion Objectives for the Worksite. The Art of Health Promotion., 5: 1-12.
10. Lodahl, M., Thomas and Kenjer, 2007. Job Involvement. Journal of Applid Psychology., <http://www.sciencedirect.com/> 23-24.
11. Mallik, S. and H.M.L. Krumholz, in: SV. Kasl, J.A. Mattera, S.A. Roumanis and V. Vaccarino, 2005. Patients with depressive symptoms have lower health status after coronary artery bypass surgery. Circulation. 111: 271-277.
12. Maslach, C. and M.P. Leiter, 2008. Early Warning Signs of Burnout: Interview with Christina Maslach, Sanfrancisco: Jossy-Bass., 215.
13. Mohammadi, M.R., H. Davydyan, A.A. Noorbala, A. Malek, N. Hossain, R. Hamid and colleagues, 2002. Epidemiology of psychiatric disorders in Iran. Research project in collaboration with the Ministry of Health and Medical Education, Department of Research and Technology, National Research Center of Medical Sciences. (in Persian).
14. Mohammadi, P., 2011. communication of Occupational stress and organizational

- commitment in employees, athletes and non athletes, Ministry of Labour and Social Affairs, Science and Society, 224: 91-99. (in Persian).
15. Morrow, J.R., A. Jackson and J.G. Disch, 2010. Measurement and evaluation in human performance. *Research Quarterly for Exercise and Sport.*, 61: 215-223.
  16. Ourangi, M. and I. Hashemzadeh, 2000. Job stress and its relation to mental health staff in hospitals in Shiraz. *Thought and Behavior.*, 23: 55-62. (in Persian).
  17. Pennebaker, J.W. and J.M. Lightner, 1980. Competition of internal and external information in an exercise setting. *Journal of Personality and Social Psychology.*, 39: 165-174.
  18. Robergs., 2003. *Fundamental Principles of Exercise Physiology: for Fitness, Performance and Health with Ready Notes & Powerweb*, McGraw-Hill Education., 1: 269-350.
  19. Rumsfeld, J. and H. Michael, 2005. Depression and cardiovascular disease. *American heart association. inc.* 111: 250-253.
  20. Sharifi, A., 2010. Prevalence of employees obesity and its relationship with lifestyle, departments and, MSc Thesis, University of Medical Sciences, Jondishapour, Diabetes Research Center, Department of Nutrition. (in Persian).
  21. Smith, J.R. and H. Michael, 2005. Depression and cardiovascular disease. *American heart association. inc.*, 111: 250-253.
  22. Sorensen, M., 2010. The effect of exercise and diet on mental health and quality of life in middle aged individuals with elevated factors for cardiovascular disease. *Journal of sport sciences.*, 5: 369-377.