

## The influence of physical fitness on the symptoms of Burnout

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### Abstract

Studies point to a positive association of the regular practice of physical exercise and reducing burnout symptoms in several professions, being also able to decrease the risk of exhaustion; reduce levels of anxiety, stress and depression; improvement of mood; increasing physical wellbeing; improving work performance, physical, mental disposition and physical fitness. The objectives of this study were to compare levels of burnout and physical fitness between the male and female individuals, as well as to analyze and to associate the levels of physical aptitude between the groups that presented high and low risk for burnout. We evaluated 44 workers, consisting of physicians and teachers, being 21 females and 23 males. The results showed that female participants had higher scores on emotional exhaustion ( $23.9 \pm 10.8$ ) compared to male participants ( $16.9 \pm 9.9$ ). The individuals with high risk for burnout had a lower performance of cardiorespiratory fitness ( $33.55 \pm 6.28$  mL/kg/min) considered as “not recommended for health” when compared to individuals with low risk. A strong negative correlation was also observed between total burnout levels ( $r = -0.714$ ,  $p = 0.058$ ) and  $VO_{2\max}$  and negative regular correlation ( $r = -0.446$ ;  $p = 0.256$ ) between professional achievement (PA) and  $VO_{2\max}$ . We conclude that better cardiovascular fitness seems to be associated with decreased burnout symptoms and better ability to cope with occupational stress.

**Keywords:** Physical Exercise, Burnout and Physical Fitness.

### Introduction

Currently, there is a great concern to not only provide adequate working conditions aiming at productivity, but also quality of life, health, and the future of the worker. Occupational stress can have a negative impact on people's health, wellbeing and professional performance (Maslach and Leiter, 2008). Long working days with few breaks for leisure or leisure time, night work periods, intense rhythms, and pressure from supervisors for higher productivity often lead to anxiety, chronic fatigue, and sleep disorders (Toker and Biron, 2012). Such symptoms are indicated in research conducted with workers and their relationships with burnout, anxiety, stress, depression and others (Khamisa, et al., 2015; Rössler, 2012; Schmidt, et al., 2013).

The term burnout is used to denote negative feelings as a consequence of prolonged exposure to occupational stress and emotional fatigue (Maslach, Schaufeli, and Leiter, 2001). Burnout is defined as a psychological process related to work overload, influenced by stressful aspects (Jackson and Maslach, 1982). It is composed and identified by three dimensions: emotional exhaustion, being a situation in which energy and emotional and physical resources are depleted; depersonalization that develops negative feelings and attitudes; and reduced professional achievement, characterized by a great dissatisfaction with work, tends to show negative evolution, and affects the ability to perform professional activities and interrelations in the work environment (Borgogni and Consiglio, 2012).

Burnout, also known as professional burnout, is a strong adversary for workers' health. Recent research seeks to understand this impact in relation to the illness of professionals (Bianchi, Schofeld, and Laurent, 2015; Fuente et al., 2015), seeking to understand how this condition contributes to the emergence of syndromes, diseases and disorders related to the mental health of the worker. Burnout is a psychological syndrome in response to chronic stressors that intervene in interpersonal relationships at work (Maslach et al., 2001).

Studies have shown the importance of the practice of physical exercise for changes in physiological aspects and in the primary prevention of various pathologies (Fang, Huang, and Hsu, 2018; Hallal et al., 2012; Lee et al., 2012). Physical exercise also plays an important role in improving various mental disorders, however its relation to burnout has not yet been elucidated (Olson, 2014). Recent studies describe the positive association of the regular practice of physical exercise and burnout symptoms in several professions, and indicate in their results a decreased risk of exhaustion; reduced levels of anxiety, stress and depression; improvement of mood; increased physical wellbeing; improved work performance, physical, and mental disposition; and increased physical fitness (Bretland and Thorsteinsson, 2015; Bruin et al., 2017; Hu, Chen, and Cheng, 2016; Lindwall et al., 2014; Naczenski et al., 2017).

The level of physical fitness constitutes a fundamental indicator for classifying the health status of individuals and the population. Physical fitness related to health can be defined as the ability to perform daily tasks with vigor and attention, without excessive fatigue and with ample energy to enjoy leisure activities, to face unforeseen emergencies, and provide a lower risk of developing diseases or chronic-degenerative conditions (American College of Sports Medicine, 2013). It has as components: cardiorespiratory endurance (ability of the circulatory and respiratory system to provide oxygen during physical activity); body composition (relative amounts of muscle, fat, bone and other vital parts of the body); muscle strength (ability of the muscle to exert force); muscle endurance (ability of the muscle to continue to perform without fatigue); and flexibility (range of motion available at a joint).

Most of the studies aim to evaluate physical fitness levels through self-reported instruments of exercise habits, such as: The International Physical Activity Questionnaire (IPAQ) and Baecke's habitual physical activity questionnaire (Johnson, et al., 2015; Rocha and Neto, 2014; Sane, et al., 2012). Although widely used, these instruments are limited as they do not provide a direct or indirect estimate of maximal oxygen consumption. Despite the evidence of the beneficial effects of physical exercise on burnout symptoms, studies that seek to assess cardiorespiratory fitness with direct and indirect tests and to associate these symptoms (Gerber, et al., 2013) are still scarce. However, some studies have reported higher levels of burnout (Carraro, et al., 2010; Naugle, et al., 2013) and higher levels of physical activity (Naugle et al., 2013) in women compared to men; others claim that men are at greater risk for burnout (D'Ambrosio, 2016), so the lack of consensus in the literature on these aspects justifies the present study. Therefore, its main hypothesis is to affirm that burnout is negatively related to the levels of physical fitness related to health.

In view of the above, the objectives of this study were to compare levels of burnout and physical fitness between the male and female genders, as well as to compare and to associate the levels of physical aptitude between the groups that presented high and low risk for burnout.

## Material & Methods

Participated in the present study a total of 44 workers, consisting of physicians (n = 14) and teachers (n=30), with a mean age of  $39.4 \pm 10.1$  years, being 21 females ( $31.81 \pm 7.72$  years old) and 23 males ( $42.74 \pm 11.14$  years of age) participated in the study.

The instruments used were Submaximal Step Test (McArdle et al., 2010), to evaluate oxygen consumption and quantify the maximal oxygen consumption ( $VO_{2max}$ ) in mL/kg/min. The following equation was used to predict the maximal oxygen consumption ( $VO_{2max}$ ): men –  $VO_{2max}$  (mL/kg/min) =  $111.33 - (0.42 \times \text{exercise heart rate obtained at the end of the test})$  and women –  $VO_{2max}$  (mL/kg/min) =  $65.81 - (0.1847 \times \text{exercise heart rate obtained at the end of the test})$ . Cardiorespiratory capacity was classified to verify the association of  $VO_{2max}$  mL/Kg/min-1 with the physical activity levels, adopting the  $VO_{2max}$  of 44.01 mL/kg/min for men and 33.01 mL/kg/min for women as the cutoff point. Values lower than these were considered as “not recommended for health” (Cureton and Warren, 1990).

Maslach Burnout Inventory-MBI (Maslach and Jackson, 1981): in order to evaluate burnout, a structured and self-administered questionnaire was used, consisting of 22 questions which identify the dimensions of the syndrome, with questions 1 to 9 related to the level of emotional exhaustion; from 10 to 17 to the professional achievement of individuals; and 18 to 22 to depersonalization. The score of the items surveyed adopted a Likert type scale, which ranges from zero to six, being 0 never and 6 every day. The factors determining the vulnerability to burnout point out that the levels of emotional exhaustion and depersonalization must be high and those of professional achievement reduced (Maslach, Schaufeli and Leiter, 2001).

Sociodemographic Inventory: the purpose of this study was to characterize individuals, including items such as age, gender, number of weekly hours worked, smoking, cardiorespiratory problems, degenerative diseases, among others.

The research was forwarded to and approved by the Research Ethics Committee of the Universidade Estadual Paulista - UNESP (Opinion No. 1.311.894). All information about the objectives and activities performed in the data collection was given to the patients, including the confidentiality of the information they provided, even if this research is presented at public events in the area. In advance of the data collection, the objectives and methodologies used in the research were presented. The initial condition for the participation in the research was completion of the individually signed free and informed consent term.

Individuals who confirmed their willingness to participate in the survey initially filled out the Maslach Burnout Inventory-MBI and were subsequently invited to perform the physical test (step test) which consists of stepping onto and off a 41.3-centimeter-high (or 16.25 inches) bench without alternating the legs, with a rhythm of four steps: step up, step up, step down, step down, for three minutes. The rate of step was 22 cycles per minute (women) and 24 cycles per minute (men) respectively, defined by a metronome (FreeMetronome Software) at 88 beats per minute (women) and 96 beats per minute (men). In relation to the synchrony of the movement of step up, step up, step down, step down, and the movement of the metronome, five seconds of practice of the cycle of movements for brief understanding of the rhythm were allowed for the participants.

A radio-transmitter strap attached to the chest and wrist was fitted with a Polar® heart monitor, Model M400, for monitoring variable chronotropism (heart rate). At the end of the test the patient was instructed to

remain standing, so that the heart rate could be measured, which in this case was measured in the fifth second after the end of the test. The entire protocol was duly explained prior to the start of the test in order to avoid its interruption.

We did not include individuals who did not accept to participate in the submaximal step test, as well as those who had some difficulty, or for physical reasons such as patellar wear, hip wear, arthrosis or any lesions and/or pathologies that made it impossible to perform the test, or for other reasons not mentioned.

Descriptive statistics were calculated (mean, median, standard deviation, minimum, maximum, relative and absolute frequency) and the non-parametric Mann-Whitney test was used for comparison between the female and male genders and between the low risk and high-risk groups for burnout. In addition to the cited tests, Spearman's linear correlation coefficient was also used to verify if there was a correlation between the three dimensions of burnout (emotional exhaustion, depersonalization, professional achievement), total burnout, and oxygen consumption. Data were analyzed by GraphPad Prism® software version 6.0 and in all statistical tests a significance level of  $p < 0.05$  was adopted.

## Results

Table 1 presents descriptive analysis to meet the first objective of the present study that was to compare the levels of burnout and physical fitness between the male and female genders. A statistically significant difference ( $p < 0.05$ ) was found only for emotional exhaustion (EE). It was observed that female participants presented higher scores when compared to males, for the EE dimension.

**Table 1.** Results obtained in the three dimensions of burnout, total burnout, and maximal oxygen consumption, and comparison (Mann-Whitney test) according to the male and female genders.

Variable	Gender	n	$\bar{x} \pm s$	Md	Min	Max	P Value
EE	Female	21	23.9±10.8	27	8	44	0.031*
	Male	23	16.91±9.90	19	0	34	
DE	Female	21	5.85±5.30	6	0	21	0.951
	Male	23	5.95±5.25	5	0	21	
PA	Female	21	35.95±5.30	35	28	44	0.364
	Male	23	34.43±5.66	35	19	48	
TB	Female	21	65.66±13.02	68	41	96	0.069
	Male	23	57.30±12.58	59	33	77	
VO <sub>2max</sub>	Female	21	35.17±3.75	35.7	24.91	39.95	
	Male	23	41.47±7.68	41.6	26.13	55.47	

Notes: Emotional Exhaustion (EE), Depersonalization (DE), Professional Achievement (PA), Total Burnout (TB), Maximal Oxygen Consumption (VO<sub>2max</sub>). \* statistically significant difference ( $p < 0.05$ ).

In the indirect evaluation of maximal oxygen consumption (VO<sub>2max</sub>) through the submaximal step test, the results show that males presented a performance classified as "not recommended for health", according to the cut-off points adopted by the present study. This fact did not occur among women, who presented better VO<sub>2max</sub> performance, classified as "recommended for health" (Table 1).

In order to meet the second objective of the research (Table 2), we chose to separate the sample into two groups, classified as low risk group (LR) and high-risk group (HR) for the symptoms associated with burnout. The high-risk group was determined by combining the levels of high emotional exhaustion and depersonalization along with reduced levels of Professional Achievement.

**Table 2.** High and low risk group scores obtained in the three dimensions of burnout, total burnout, and maximal oxygen consumption, and comparison (Mann-Whitney test).

Variable	Group	n	$\bar{x} \pm s$	Md	Min	Max	P Value
EE	High Risk	8	33.75±6.62	35.0	26.0	44.0	<0.0001*
	Low Risk	36	17.25±9.17	17.5	0.0	33.0	
DE	High Risk	8	12.37±3.99	10.5	9.0	21.0	<0.0001*
	Low Risk	36	4.47±4.29	4.0	0.0	21.0	
PA	High Risk	8	29.62±4.65	31.5	19.0	33.0	0.0015*
	Low Risk	36	36.38±4.90	37.0	28.0	48.0	
TB	High Risk	8	75.75±11.49	76	60	96	0.0006*
	Low Risk	36	58.11±11.58	58.5	33	77	
VO <sub>2max</sub>	High Risk	8	33.55±6.28	33.15	24.91	43.53	
	Low Risk	36	39.55±6.55	37.33	26.13	55.47	

Notes: Emotional Exhaustion (EE), Depersonalization (DE), Professional Achievement (PA), Total Burnout (TB), Maximal Oxygen Consumption (VO<sub>2max</sub>). \* statistically significant difference ( $p < 0.05$ ).

The Mann Whitney test was used to compare the high risk ( $n = 8$ ) and low risk ( $n = 36$ ) groups according to the three dimensions of burnout and also the maximal oxygen consumption (VO<sub>2max</sub>). There was a statistically significant difference between the HR and LR groups in the three dimensions of emotional exhaustion (EE), depersonalization (DE) and professional achievement (PA) ( $p < 0.05$ ). The results presented

(Table 2) reveal that the members of the high-risk group (HR) for burnout had a lower performance of cardiorespiratory fitness ( $33.55 \pm 6.28$  mL/kg/min) considered as “not recommended for health” when compared to the low risk (LR) group.

A linear Spearman correlation test was applied to verify the correlations between the three dimensions of burnout (emotional exhaustion (EE), depersonalization (DE), professional achievement (PA) and maximal oxygen consumption ( $VO_{2max}$ ). The results were also submitted to comparative analysis between the high risk (HR) and low risk (LR) groups performed using the Mann Whitney test, and a significance level set at  $p < 0.05$  was adopted. Table 3 shows the distributions of the associations between the independent variables (EE, DE and RP) and the dependent variable ( $VO_{2max}$ ) and the high risk and low risk groups.

**Table 3.** Spearman correlation and Mann Whitney test among the three dimensions of burnout, total burnout, and maximum oxygen consumption referring to the high and low risk groups.

	High Risk Group				
	$VO_{2max}$	Emotional Exhaustion	Depersonalization	Professional Achievement	Total Burnout
$VO_{2max}$		-0.831*	-0.049	-0.446	0.714
Emotional Exhaustion	-0.831*		0.284	0.494	0.952*
Depersonalization	-0.049	0.284		-0.161	0.244
Professional Achievement	-0.446	0.494	-0.161		0.639
Total Burnout	-0.714	0.952*	0.244	0.639	
	Low Risk Group				
	$VO_{2max}$	Emotional Exhaustion	Depersonalization	Professional Achievement	Total Burnout
$VO_{2max}$		-0.236	-0.125	0.027	-0.235
Emotional Exhaustion	-0.236		0.016	0.156	0.850*
Depersonalization	-0.125	0.016		0.023	0.316
Professional Achievement	0.027	0.156	0.023		0.488*
Total Burnout	-0.235	0.850*	0.316	0.488*	

Notes: Emotional Exhaustion (EE), Depersonalization (DE), Professional Achievement (PA), Maximal Oxygen Consumption ( $VO_{2max}$ ). \* statistically significant difference ( $p < 0.05$ ).

When analyzing Table 3, the high risk group that had a strong negative linear correlation and a statistically significant difference ( $r = -0.831$ ;  $p = 0.011$ ) between emotional exhaustion (EE) and maximal oxygen consumption ( $VO_{2max}$ ) can be observed. A strong negative correlation was also observed between total burnout ( $r = -0.714$ ,  $p = 0.058$ ) and  $VO_{2max}$  and negative regular correlation ( $r = -0.446$ ;  $p = 0.256$ ) between professional achievement (PA) and  $VO_{2max}$ . However, in the low risk group, there were no significant associations between EE and  $VO_{2max}$ , DE and  $VO_{2max}$ , and PA and  $VO_{2max}$  which means that there was no linear relationship between these variables.

## Discussion

One of the objectives of this study was to advance the research on the relations between the regular practice of physical exercise and the symptoms related to burnout. To achieve this purpose, the submaximal step test was used (McArdle, Katch and Katch, 2010), which indirectly evaluates oxygen consumption and quantifies the maximal oxygen consumption ( $VO_{2max}$ ). In this study, when analyzing the three dimensions referring to burnout, the results revealed that women described higher levels of emotional exhaustion (EE) when compared to men. This result is similar to that found in other studies (Carraro et al., 2010; Giacobbi, 2009; Naugle et al., 2013; Walter, et al., 2009) where women reported higher EE scores than men. It is important to note that physical and emotional exhaustion refers to feelings of personal incapacity and exhaustion due to involvement with work.

Despite the higher emotional exhaustion, women had higher oxygen consumption than men. In predicting cardiorespiratory capacity, the results of the present study revealed that women are physically more active, with performance ranked according to the proposal of Cureton and Warren, (1990) as “recommended for health”. However, the men presented a troubling result classified as “not recommended for health”. Surprisingly, men reported lower levels of EE, but presented worse performance in the submaximal step test than women; this result should be viewed with caution. Future research should investigate why women experience higher levels of emotional exhaustion (EE) but show better cardiorespiratory performance.

The hypothesis that burnout is negatively related to levels of health-related physical fitness has been confirmed. A strong negative correlation was found between emotional exhaustion, total burnout and maximal oxygen consumption levels ( $VO_{2max}$ ) in the high risk group. We found a single survey (Gerber et al., 2013) on cardiorespiratory fitness as a protector of symptoms of burnout using an indirect physical fitness test. Although the results showed that the participants with low cardiorespiratory fitness reported higher levels of burnout, the

indirect Astrand test was carried out on a stationary bicycle and to evaluate burnout the Shiron-Melamed Burnout Questionnaire (SMBQ: 38) was used to measure the maximal oxygen consumption ( $VO_{2max}$ ), so it is premature to establish any comparison with the present study. The best cardiovascular fitness seems to be associated with decreased burnout symptoms and better ability to cope with stress at work (Gerber et al., 2013). However, longitudinal studies are still needed to identify how cognitive, social, emotional and biological aspects that determine this inverse relationship between the high burnout scores are related to low values of cardiorespiratory fitness.

However, 18 % of the evaluated professionals present symptoms of risk for burnout. In this context, the use of alternatives that can develop protective factors to/for work-related stress is increasingly discussed in the literature, and regular physical exercise has been addressed in this context (Alexandrova-Karamanova et al., 2016; Bruin et al., 2017; Fang et al., 2018; Gerber et al., 2013; Johnson et al., 2015;). In addition to being a protective factor for work-related stress, the levels of physical exercise practiced may be related to the non-appearance of more severe symptoms of burnout or to the reduction of its effects (Sane et al., 2012).

Although physical exercise seems effective in reducing burnout symptoms, it is still unclear what type, intensity, duration, or frequency of exercise may be the most effective. However, involvement with physical exercise once or twice a week for 4 to 18 weeks has positive effects on prevention, and reduces symptoms of burnout. This effect is visible initially in sedentary workers, however more exhausted workers may have greater difficulties and motivation to start and stay in a physical exercise program (Naczenski et al., 2017). Involvement with physical exercise can also help a person deal more effectively with daily stress, have better interaction with people, and have better control over their anger and aggression (Sane et al., 2012).

Several limitations may be highlighted in the current study, one of which is the use of a convenience sample, being composed of doctors and teachers, which prevents generalization of the results. Many professionals refused to perform the submaximal step test, alleging lack of time and availability to participate in the survey; this is very likely reflected in the reduced number of participants. However, workers who experience high levels of burnout symptoms often do not want to participate in research. When fatigued, people have a lesser tendency to start or complete a task, especially when this task requires great effort. As physical activity requires effort, it can be assumed that high levels of fatigue negatively affect workers' physical exercise levels (Naczenski et al., 2017). Another aspect to be highlighted is that this study was characterized as transversal, thus the measures were performed only once, however, workers may manifest occupational stress with greater or lesser intensity at different times of their professional career.

### Practical implications

Due to the wide practical implications, these results demonstrate the importance of the process of evaluating cardiorespiratory physical fitness, and can be an important component of the behavioral change of workers and motivate them to adopt an active lifestyle, adhere to a physical exercise program, improve quality of life and wellbeing, and prevent occupational stress. It is also worth mentioning that this study extends to public health policy programs, which are of great importance for professionals in this area. Because of the monitoring of physical fitness and symptoms of burnout, it will enable the identification of strategies that will allow the delineation of preventive and intervention programs with the objectives of providing the physical and psychological wellbeing of the worker.

### Conclusion

In view of the results, it was concluded that women reported higher levels of emotional exhaustion when compared to men; nevertheless, they presented superior cardiorespiratory fitness. Participants with higher levels of burnout symptoms were negatively associated with a lower performance in the cardiorespiratory fitness test. Based on the literature, better cardiovascular fitness seems to be associated with decreased burnout symptoms and better ability to cope with occupational stress.

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