

**Sedentary Life Style is Associated with an Elevated Perceived Stress**

Caio Victor de Sousa<sup>1</sup>, Marcelo Magalhães Sales<sup>1,2</sup>, José Fernando Vila Nova de Moraes<sup>3</sup>, Pollyana de Oliveira Rocha<sup>2</sup>, Renan Renato Cruz dos Santos<sup>4</sup>, Bernardo Petriz de Assis<sup>1,2</sup>

<sup>1</sup>Programa de Mestrado e Doutorado em Educação Física da Universidade Católica de Brasília Brasília, Brazil; <sup>2</sup>UDF – Centro Universitário, Brasília, Brazil; <sup>3</sup>Universidade Federal do Vale do São Francisco, Pernambuco, Brazil; <sup>4</sup>Faculdade de Educação Física da Universidade de Brasília, Brasília, Brazil

**ABSTRACT**

**Sousa CV, Sales MM, Moraes JFVN, Rocha PO, Santos RRC, Assis BP.** Sedentary Life Style is Associated with an Elevated Perceived Stress. **JEP**online 2014;17(6):90-96. Chronic stress is associated with detrimental effects on physical health that is likely to decrease a person's quality of life. Studies have indicated that regular exercise is an excellent non-pharmacological strategy to prevent and/or treat anxiety, stress, and depression. This study estimated the prevalence of elevated perceived stress among individuals with different levels of physical activity and to verify the association between both. Twenty-seven subjects (mean age, 33.5 yrs) were submitted to two questionnaires to verify their level of physical activity and perceived stress. The Fisher's exact test and chi-square were used for comparison between frequency. To verify the association between the level of physical activity and the chance of elevated perceived stress, the binary logistic regression was used. The values were presented in Odds Ratio and intervals of confidence (IC=95%). The subjects stratified as sedentary (48.1%) were 3.018 times more likely to have elevated perceived stress compared to their physically active peers. In conclusion, the results indicate that individuals who practice regular exercises have lower scores of perceived stress, and sedentary people have higher scores of perceived stress.

**Key Words:** Motor Activity, Mental Health, Chronic Diseases

## INTRODUCTION

In a recent and elegant randomized clinical trial with 1,127 young adults, Swedes et al. (24) reported a high prevalence of perceived stress, symptoms of depression, and sleep disturbances among young adults (23%) (1). In Brazil, the prevalence of stress in bank workers can reach 50% (15). Similarly, in medical students, 49.7% of the students surveyed showed symptoms of stress (1).

It is well established that anxiety and stress can trigger factors for various diseases, such as metabolic and cognitive disorders. Anxiety and stress can even contribute to the development of some cancers by decreasing the immune responses in the human body (19,26,27). Stress, in particular, is also associated with premature death from a serious coronary or cerebral event (14). People who suffer from stress and social isolation often neglect their emotional and physical health. As a result, many adopt a sedentary lifestyle that is strongly linked to cardiovascular disease (4) and other physiological disorders such as type 2 diabetes and systemic arterial hypertension (8,19).

On the other hand, it is increasingly clear that regular exercise is an excellent non-pharmacological strategy to prevent and treatment anxiety, stress, and depression (13,16,21). Systematic physical exercise is associated with positive changes in mood state, which can generate a psychological well-being that increases a person's resistance to daily stress. Yet, for some reason, there is not even one study in Brazil that has tried to associate the level of physical activity with perceived stress.

Thus, the purpose of this study is to estimate the prevalence of elevated perceived stress among individuals with different levels of physical activity and exercise and to document the association between them.

## METHODS

### Subjects and General Procedures

This study consisted of 27 subjects of both sexes (10 men and 17 women) with a mean age of  $33.5 \pm 15.3$  (range, 15 and 86 yrs of age). The short version of the International Physical Activity Questionnaire (IPAQ) validated by the Portuguese by Matsudo (18) was used to determine the subjects' physical activity level. Perceived stress was estimated through the score analysis from the questionnaire proposed by Cohen (5), and validated for the population used by Luft (17).

The same researcher applied the questionnaires at the same hour of the day (8:00 a.m.). The subjects were free to choose which questionnaire to answer first (IPAQ or perceived stress). There was no time limit for completion. The subjects were asked to express what immediately comes to their mind, thus encouraging a response that was true of their psycho-emotional state.

Before data collection, the subjects were informed of the research procedures. Each subject signed an informed consent form in accordance with Resolution 196/96 of the National Health Council of Brazil (2).

## Statistical Analyses

The normality and homogeneity of the data were determined using the Shapiro-Wilk and Levene tests, respectively. The data concerning the subjects' age were expressed as mean  $\pm$  standard deviation. The Fisher's exact test was used to compare frequency for groups less than five ( $n < 5$ ) subjects. When the number of subjects was higher than five ( $n > 5$ ), chi-square was used. Moreover, to verify the association between the level of physical activity and the chance of elevated perceived stress, we used the binary logistic regression of which the values were presented in Odds Ratio and intervals of confidence (IC=95%). The significance level was set at 5% ( $P < 0.05$ ). All procedures were carried out using the Statistical Package for Social Sciences for Windows (SPSS 15.0).

## RESULTS

The present investigation indicates that subjects stratified as sedentary show higher scores of perceived stress (33.3%;  $P = 0.001$ ) compared to the physically active subjects (48.2%;  $P = 0.001$ ). The subjects stratified as sedentary (48.1%) were 3.018 (1.318 - 6.909) times likely to have a higher perceived stress level in comparison to the active subjects (Table 2).

**Table 1. Comparison between Sedentary and Active Rates with Perceived Stress Level.** The data are expressed in absolute (n) and relative (%) rate.

Stress level	Sedentary	Active	P value
	n (%)	n (%)	
Elevated Stress	9 (33.3)	1 (3.7)	0.001
Lower Stress	4 (14.8)	3 (48.2)	

**Table 2. Association of the Physical Activity Level and Elevated Perceived Stress (n=27).**

	n	%	OR (IC 95%)
Active	14	51.9	1
Sedentary	13	48.1	3.018* (1.318 - 6.909)

OR – Odds Ratio: \* $P < 0.05$ .

## DISCUSSION

The purpose of this study was to compare the prevalence of elevated perceived stress between different levels of physical activity. The intent was to demonstrate that an important relationship

exists between being physically active and self-reported psychological stress. In agreement with this thinking, in addition to a body mass index in the healthy range, a low waist/hip ratio, and not smoking, Hodge et al. (11) indicated that being physically active is associated prospectively with successful aging. Sustained physical activity improves survival and the aging process, especially in regards to the perception of stress and the risk of cardiovascular diseases and metabolic disorders such as type 2 diabetes and systemic arterial hypertension (8,19).

Our findings highlight that the sedentary subjects were 3.018 (1.318 - 6.909) times more likely to have an elevated perceived stress than the active subjects. Also, it was apparent that they were more exposed to developing chronic non-communicable diseases. The deleterious effects of physical inactivity are substantially increased with the perception of high stress that predisposes individuals to increased sympathetic nerve activity (3,10). The increase in adrenergic activity may contribute to an increase in blood pressure and cardiovascular mortality.

The external stress caused by the daily activities can lead to a higher activity of sympathetic nervous system (SNS) (22), which may induce a higher secretion of catecholamines. Adrenaline is a well-known insulin-antagonist that leads to an accumulation of blood glucose, as well as promoting the hepatic glycogenolysis. If this becomes very frequent, it may lead to an insulin resistance and/or even type 2 diabetes (12). In addition, the stress induced increase in SNS activity favors the release of catecholamines that cause vasoconstriction and an increase in blood pressure.

An increase in SNS activity may also result in an increase in oxidative stress that reduces the bioavailability of nitric oxide (NO). This is not good because NO is a powerful vasodilator plus there is an associated reduction in tetrahydrobiopterin, which is an important cofactor of NO synthase. The limited NO can then lead to stimulating arterial wall inflammation and atherosclerosis with reduced functionality of the endothelium (9,10). Chronic physiological stress is also associated with a high oxidative stress, thus resulting in an accelerated cell aging that favors the emergence of non-communicable chronic diseases commented above (7).

On the other hand, regular physical activity is responsible for reducing the activation of the SNS and cortisol in response to daily stressors (6,20,25). This physiological adaptation renders active individuals less sensitive to the acute stress triggers (23), and it decreases their perceived stress levels. Hence, it is reasonable to infer that physically active individuals are more protected against the development of cardiovascular and metabolic diseases.

Although the results of the present study are interesting, they should be analyzed with caution given the small sample size, the cross-section nature of the study, and the methods used to estimate the levels of stress and physical activity. Also, the fact that catecholamine concentration and maximal oxygen consumption were not measured is a limitation of this study. Lastly, it is worth noting that the results presented in this study did not establish any cause and effect relationship.

However, despite these limitations, to our knowledge this is the first study performed with Brazilian people that report having a high prevalence of stress symptoms (1,15). We believe it is important that more studies without the limitations raised in this study will help to better understand the relationship of the level of physical activity with perceived stress.

## CONCLUSIONS

The subjects stratified as sedentary (48.1%) were 3.018 times more likely to have elevated perceived stress compared to their physically active peers. These findings indicate that individuals who practice regular exercises have lower scores of perceived stress while sedentary people have higher scores of perceived stress.

---

**Address for correspondence:** Caio Victor de Sousa, Programa de Mestrado e Doutorado em Educação Física da Universidade Católica de Brasília, EPTC, QS07, LT1 s/n. Bloco G Sala 15, Águas Claras, DF, Brazil, CEP 72030-170, Email: cvsousa89@gmail.com

---

## REFERENCES

1. Aguiar SM, Vieira APGF, Vieira KMF, Aguiar SM, Nóbrega JO. Prevalência dos sintomas de estresse nos estudantes de medicina. *J Bras Psiquiatria*. 2009;58(1):34-38.
2. Brasil. Ministério da Saúde. **Conselho Nacional de Saúde do Brasil**. Resolução nº 196, de 10 de outubro de 1996. Aprovar as seguintes diretrizes e normas regulamentadoras de pesquisas envolvendo seres humanos. Diário Oficial da República Federativa do Brasil, Brasília, DF, 11 out. 1996. Seção 1. Disponível em: <http://conselho.saude.gov.br>. Access in: 13 out 2014.
3. Carnethon M, Jacobs DJ, Sidney S, Liu K. Influence of autonomic nervous system dysfunction on the development of type 2 diabetes: The cardia study. *Diabetes Care*. 2003;26:3035-3041.
4. Cheik NC, Reis IT, Heredia RAG, Ventura ML, Tufik S, Antunes HKM, Mello MT. Efeito do exercício físico e da atividade física na depressão e ansiedade em indivíduos idosos. *Revista Brasileira de Ciência e Movimento*. 2003;11(3):45-52.
5. Cohen S, Karmack T, Mermelsteinm R. A global measure of perceived stress. *J Health Soc Behav*. 1983;24(4):385-396.
6. Dishman RK, Berthoud HR, Booth FW, Cotman CW, Edgerton VR. Neurobiology of exercise. *Obes Res*. 2006;14(3):345-356.
7. Epel ES, Blackburn EH, Lin J, Dhabhar FS, Adler NE. Accelerated telomere shortening in response to life stress. *Proceedings of the National Academy of Sciences*. 2004;101(49):17312–17315.
8. Epel ES, Lin J, Wilhelm FH, Wolkowitz OM, Cawthon R. Cell aging in relation to stress arousal and cardiovascular disease risk factors. *Psychoneuroendocrino*. 2006;31(3):277-287.
9. Grossman E. Does increased oxidative stress cause hypertension? *Diabetes Care*. 2008; 31(2)185-189.

10. Harrison DG, Guzik TJ, Lob HE, Madhur MS, Marvar PJ, Thabet SR. Inflammation, immunity and hypertension. *Hypertension*. 2011;57:132-140.
11. Hodge AM, English DR, Giles GG, Flicker L. Social connectedness and predictors of successful ageing. *Maturitas*. 2013;75(4):361-366.
12. Jensen J, Ruge T, Lai YC, Svensson MK, Eriksson JW. Effects of adrenaline on whole-body glucose metabolism and insulin-mediated regulation of glycogen synthase and PKB phosphorylation in human skeletal muscle. *Metabolism*. 2011;60(2):215-226.
13. Jerma M, Ball K, Salmon A. Effects of a holistic health program on women, physical activity and mental and spiritual health. *J Sci Med Sport*. 2006;9:395-401.
14. Kiecolt-Glaser JK, Glaser R. Chronic stress and mortality among older adults. *JAMA*. 2009;282(23):2259.
15. Koltermann ITAP, Tomasi E, Horta BL, Koltermann AP. Estresse ocupacional em trabalhadores bancários: Prevalência e fatores associados. *Revista Saúde (Santa Maria)*. 2010;37(2):33-48.
16. Kruk J. Physical activity in the prevention of the most frequent chronic diseases: An analysis of the recent evidence. *Asian Pac J Cancer Prev*. 2007;8(3):325-338.
17. Luft DB. Versão brasileira da Escala de Estresse Percebido: Tradução e validação para idosos. *Revista Saúde Pública*. 2007;41(4):606-615.
18. Matsudo SM, Araújo TL, Matsudo VKR, Andrade DR, Andrade EL, Oliveira LC. Questionário Internacional de Atividade Física (IPAQ): Estudo de validade e reprodutibilidade no Brasil. *Revista Brasileira Atividade Física e Saúde*. 2001.
19. Mooy M, De Vries H, Grootenhuis PA, Bouter LM, Heine RJ. Major stressful life events in relation to prevalence of undetected type 2 diabetes. *Diabetes Care*. 2000;23(2):197-201.
20. Mueller PJ. Exercise training and sympathetic nervous system activity: Evidence for physical activity dependent neural plasticity. *Clin Exp Pharmacol Physiol*. 2007;34(4):377-384.
21. Mutrie N. The relationship between physical activity and clinically defined depression. In: Biddle SJH, Fox KR, Boutcher SH (Eds). *Physi Act Psychol Well-Being*. London: Routledge, 2000.
22. Oparil S, Zaman MA, Calhoun DA. Pathogenesis of hypertension. *Ann Intern Med*. 2003;139(9):761-776.
23. Puterman E, Lin J, Blackburn E, O'Donovan A, Adler N, Epel E. The power of exercise: Buffering the effect of chronic stress on telomere length. *PLoS One*. 2010;5(5):10837.
24. Thomée S, Eklöf M, Gustafsson E, Nilsson R, Hagberg M. Prevalence of perceived stress, symptoms of depression and sleep disturbances in relation to information and communication technology (ICT) use among young adults - an explorative prospective study. *Comput Human Behav*. 2007;23(3):1300-1321.

25. Traustadóttir T, Bosch PR, Matt KS. The HPA axis response to stress in women: Effects of aging and fitness. *Psychoneuroendocrino*. 2005;30(4):392–402.
26. Sephton SE, Sapolsky RM, Kraemer HC, Spiegel D. Diurnal cortisol rhythm as a predictor of breast cancer survival. *J Natl Cancer Inst*. 2000;92:994-1000.
27. Wright B, Peters E, Ettinger U, Kuipers E, Kumari V. Understanding noise stress-induced cognitive impairment in healthy adults and its implications for schizophrenia. *Noise Health*. 2014;16:166-176.

### **Disclaimer**

The opinions expressed in **JEPonline** are those of the authors and are not attributable to **JEPonline**, the editorial staff or the ASEP organization.