

# THE RELATIONSHIP BETWEEN LEISURE TIME PHYSICAL ACTIVITY, SOCIO - DEMOGRAPHIC CHARACTERISTICS AND THE LEVELS OF PERCEIVED STRESS

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## Abstract

The aim of this study was to explore the association between leisure time physical activity, socio-demographic characteristics and the levels of perceived stress. The study included 300 respondents who were divided into two groups: high levels of perceived stress (n=150) and low levels of perceived stress (n=150). Levels of perceived stress were assessed using the Perceived Stress Scale-10. Data concerning leisure-time physical activities and socio-demographic characteristics were collected using a designed questionnaire. Age between 46-64 years (OR=5.63, 95%CI=1.02-2.55; p=0.00), financial status as worse than average (OR=2.29, 95%CI=1.39-3.76; p=0.00) and female gender (OR=1.62, 95%CI=1.02-2.55; p=0.03) were positively associated with high levels of perceived stress. The currently recommended weekly volume of  $\leq 1150$  minutes of physical activity of moderate intensity in leisure time had a protective role against a high level of perceived stress (OR=0.44, 95%CI=0.25-0.77; p=0.00). Therefore, we conclude that promoting the currently recommended volume of physical activity might be a good way to increase overall physical activity levels and reduce a perceived stress among population groups at risk for high levels of perceived stress specifically, as well as the general population.

Key words: exercise, leisure activities, stress physiological, social-class

## Introduction

There is no universal agreement on the definition of stress. McEwen (2007) simply states, "Stress is a word used to describe experiences that are challenging emotionally and physiologically". According to a transactional model of stress, stress is experienced when a person perceives that the demands overload or exceed the personal and social resources the individual is able to mobilize (Lazarus and Folkman, 1984). Perceived stress is an individual's global appraisal of the degree to which situations in her life are overwhelming (Cohen, Kamarck and Mermelstein, 1983). Most stress assessment methods primarily focus on an individual's subjective perception of stress. The Perceived Stress Scale (PSS) is worldwide used tool for assessing perceived stress. As the questions are general in nature, the scale is considered broadly applicable for any population subgroup (Kopp et al., 2010).

The PSS has been applied in diverse samples and in some studies investigating the association of perceived stress with sociodemographic variables

(such as sex, age, nationality, marital status, education, parental status, employment status, and income class). Regarding socio-demographic characteristics, PSS scores were in some studies significantly lower in younger, married, and employed participants (Ano and Vasconcelles, 2005; Koenig, 2009). Previous studies have shown that women reported more perceived stress than men (Klein et al., 2016). In cross-sectional studies, high levels of perceived stress have been found among people with low socioeconomic status (SES) measured by education and income level (Nielsen et al., 2008). Some studies investigating the association of perceived stress with physical activity (PA). Several studies reported an inverse relationship between these two constructs (Sinha and Jastreboff, 2013). Physical activity has been reported to protect people from the harmful consequences of stress (Salmon, 2001). It is important because a growing body of evidence suggests that perceived stress is a precursor for numerous poor health outcomes including inflammation and cardiovascular disease, and is a predictor of all-cause mortality (Fioranelli et

al., 2018). Perceived stress was significantly associated with higher odds of health-risk behavior and the co-occurrence of health-risk behaviours (Kurspahić-Mujčić et al., 2014). It was reported that when more than a certain amount of physical activity is performed during leisure time, it lowers the probability of feeling stressed (Aldana et al., 1996). The general recommendations on PA for wellbeing (Physical Activity Guidelines Advisory Committee 2008, World Health Organization 2010) are that healthy adults should perform at least 150 minutes of aerobic moderate-intensity PA per week in order to achieve substantial health benefits.

Previous studies suggests that physical activity, especially leisure time physical activity (LTPA), is increasingly important for sociodemographic groups, which are disadvantaged by high levels of perceived stress (Pampel, Krueger, and Denney, 2010). Leisure time physical activity do not require specific skills or equipment and are easily accessible to most individuals (Füzéki and Banzer, 2018).

Therefore, the aim of this study was to explore the association between leisure time physical activity, socio-demographic characteristics and the levels of perceived stress in adults aged 18–64 years in the area of Sarajevo Canton.

## Methods

### Sample subjects

This cross-sectional study was carried out in family medicine outpatient departments of the Public Institution Primary Health Care Center of Canton Sarajevo, Bosnia and Herzegovina (B&H) in period 1 March – 30 June 2017. The respondents were patients who used health care services at the Primary Health Care Center during the course of the study period. The study included 300 respondents on the principle of systematic random sampling. The respondents were classified into two groups according to their Perceived Stress Scale scores: 0-17 points (low levels of perceived stress; n=150) and 18-40 points (high levels of perceived stress; n=150).

The inclusion criteria were adults aged 18–64 years who have a medical record in the Primary Health Care Center of the Sarajevo Canton, persons who regularly engage in moderate-intensity leisure time physical activities. The exclusion criteria were persons younger than 18 or older than 64 years, persons who do not have medical records at the Primary Health Care Center of the Sarajevo Canton, pregnant, postpartum women, inactive adults (0 minutes per week moderate intensity physical activity), adults with chronic noncommunicable conditions related to mobility.

### Sample variables

Respondents were asked to complete an anonymous questionnaire containing questions related to gender, age, education level, self-perceived financial status, leisure-time physical activities and the Perceived Stress Scale.

Formal education level was categorized as incomplete elementary school, completed elementary school, completed secondary school, completed high school and completed university. Self- perceived financial status was categorized as worse than average, average and better than average.

Study assessed volume of physical activity. Volume of leisure-time physical activities was calculated as the minutes per week that participants reported participating in moderate intensity LTPA. Respondents reported the number of days and minutes spent in moderate recreational activities in a week by answering the questions “In a typical week, on how many days do you do moderate-intensity sports, fitness, or recreational activities?” and “Minutes moderate recreational activities.” We summarized the total number of minutes. Respondents were classified into 3 categories: physically active >60 minutes per week, physically active 60-149 minutes per week and physically active ≤150 minutes per week.

According to World Health Organization physical activity guidelines, a person who is physically active ≤150 minutes per week was considered as a complier to the WHO physical activity recommendations (World Health Organization, 2010). Leisure-time physical activities were defined as exercise, sports, recreation, or hobbies that are not associated with regular job-, household-, or transportation-related activities (U.S. Department of Health and Human Services, 1996).

We assessed the level of stress perceived by each participant in the past 30 days through the Perceived Stress Scale -10 (Cohen, Kamarck and Mermelstein, 1983). Each item (eg, “In the last month, how often have you been angered because of things that were outside of your control?”) was rated on a 5-point Likert scale that ranged from 0 (never) to 4 (very often). Possible total scores range from 0 to 40; 40 points represent the highest perceived stress level; 18-40 points represent high levels of perceived stress.

### Statistical analysis

The collected data were analyzed using IBM Statistics SPSS v 23.0 i MedCalc v12.3. Independent sample t-test, Chi-square ( $\chi^2$ ) and logistic regression analysis were used. The results of logistic regression analyses were reported as odds ratios (OR) and 95% confidence intervals. Results of the analysis were considered statistically significant with p-value less than 0.05.

## Results

The study evaluated 300 respondents in two groups of 150 each (i.e., high levels of perceived stress and low levels of perceived stress).

In the group with high levels of perceived stress, women were more represented (56.7%), while in the group with low levels of perceived stress, men were more represented (55.3%). No significant gender differences were observed between the group with a high and the group with a low levels of perceived stress ( $p=0.04$ ).

Majority of the respondents were within 26-45 age group. The age distribution of the two groups was similar and there was no significant difference ( $p=0.38$ ).

Formal education level in the group with a high and the group with a low levels of perceived stress was not significantly different ( $p=0.14$ ). A slightly larger number of respondents with the university degree were in the group with a low levels of perceived stress, 86 (57.3%), than in the group with a high levels of perceived stress, 69 (46.0%).

Self-perceived financial status in the group with a high and the group with a low levels of perceived stress was significantly different ( $p=0.00$ ). More respondents with the financial status, which was better than average, was in the group with a low

levels of perceived stress, 63 (42.0%), than in the group with a high levels of perceived stress, 36 (24.0%) (Table 1).

More respondents who reported  $\geq 150$  minutes of physical activity per week, was in the group with a low levels of perceived stress 45 (30.0%), than in the group with a high levels of perceived stress 24 (16.0%) ( $p=0.01$ ) (Table 2).

Respondents aged between 46-64 years were represented a particularly vulnerable group in terms of high levels of perceived stress (OR=5,63, 95%CI=1,02-2,55;  $p=0,00$ ).

Respondents who evaluated their financial status as worse than average compared to those who evaluated their financial status as average had 2.2 times higher risk of having high levels of perceived stress (OR=2,29, 95%CI=1,39-3,76;  $p=0,00$ ).

Females were 1.6 times more likely to have high levels of perceived stress than males (OR=1,62, 95%CI=1,02-2,55;  $p=0,03$ ) (Table 3).

A weekly volume of  $>60$  minutes of leisure-time moderate physical activity was associated with high levels of perceived stress (OR=1.62, 95%CI=1.02-2.57;  $p=0.03$ ).

A weekly volume of  $\leq 1150$  minutes of leisure-time moderate physical activity has a protective role against a high level of perceived stress (OR=0.44, 95%CI=0.25-0.77;  $p=0.00$ ) (Table 4).

**Table 1** Socio-demographic characteristics of respondents according to level of perceived stress

Characteristics	Perceived stress level		p
	High No (%)	Low No (%)	
Gender			
Males	65 (43.3)	83 (55.3)	0.04
Females	85 (56.7)	67 (44.7)	
Age group (years)			
18-25	12 (8.0)	15 (10.0)	0.38
26-45	96 (64.0)	103 (68.7)	
46-64	42 (28.0)	32 (21.3)	
Education level			
Incomplete elementary school/ completed elementary school	14 (9.3)	11 (7.3)	0.14
Completed secondary school	67 (44.7)	53 (35.3)	
Completed high school /university	69 (46.0)	86 (57.3)	
Self-perceived financial status			
Worse than average	27 (18.0)	18 (12.0)	0.00
Average	87 (58.0)	69 (46.0)	
Better than average	36 (24.0)	63 (42.0)	

**Table 2** Volume of physical activity according to level of perceived stress

Physical activity - minutes per week	Perceived stress level		p
	High No (%)	Low No (%)	
$>60$	77 (51.3)	59 (39.3)	0.01
60-149	49 (32.7)	46 (30.7)	
$\leq 150$	24 (16.0)	45 (30.0)	

## Discussion

This study evaluated relation between leisure time physical activity, socio-demographic characteristics and the levels of perceived stress.

The results revealed that a weekly volume of  $\leq 150$  minutes of leisure-time moderate physical activity (the currently recommended volume of physical activity) has a protective role against high levels of perceived stress. Interestingly, the present study showed that a weekly volume of  $>60$  minutes of leisure-time moderate physical activity is associated with a high levels of perceived stress. These findings support and add to previous literature demonstrating that the currently recommended volume of physical activity is

associated with improved psychological wellbeing and lower levels of perceived stress (WHO, 2010; Physical Activity Guidelines Advisory Committee, 2008; Janssen and LeBlanc, 2010). In contrast, Brown et al. observed that improvements in the mental health occurred via LTPA, regardless of reaching or not the recommended levels of physical activity aimed at promoting health (Brown et al., 2003).

There are several mechanisms potentially involved in the relationship between physical activity and stress. Physical activity may confer protective effects on mental health by increasing resilience to stress via enhanced regulation of the stress response (Forcier et al. 2006).

**Table 3** The relationship between socio-demographic characteristics and level of perceived stress

	p	OR (95%CI)
Gender		
Male	0.42	0.61 (0.39-0.97)
Female	0.03	1.62 (1.02-2.55)
Age group (years)		
18-25	0.38	1.26 (0.57-2.80)
26-45	0.45	1.18 (0.73-1.92)
46-64	0.00	5.63 (0.25-1.48)
Education level		
Lower education	0.05	1.57 (1-2.48)
Higher education	0.07	0.65 (0.41-1.03)
Self-perceived financial status		
Worse than average	0.00	2.29 (1.39-3.76)
Average	0.03	0.61 (0.39-0.97)
Better than average	0.14	0.62 (0.32-1.18)

*lower education - incomplete elementary school/ completed elementary school. completed secondary school; higher education - completed high school /university; OR – odds ratio; 95%CI - the 95% confidence interval*

**Table 4** The relationship between the volume of physical activity and level of perceived stress

	p	OR (95%CI)
Physical activity – minutes per week		
$>60$	0.03	1.62 (1.02-2.57)
60-149	0.70	0.91 (0.56-1.48)
$\leq 150$	0.00	0.44 (0.25-0.77)

*OR – odds ratio; 95%CI – the 95% confidence interval*

The Cross Stressor Adaptation Theory postulates that physical activity predict well-regulated cardiovascular activity. Repeated bouts of exercise lead to physiological adaptations, including decreases in resting heart rate and blood pressure and increases in parasympathetic activity (Tulppo et al., 2003). Regular leisure time physical activity may provide antidepressant and anxiolytic effects, and are capable of protecting the organism from the harmful effects of stress on physical and mental health (Salmon, 2001). Despite the well-known benefits of physical activity, the practice of this behavior is very low. Considering

WHO PA recommendations 23% of study respondents met the criteria in total – 30.0% respondents in the group with low levels of stress and 16.0% respondents in the group with high levels of stress. These results were similar to those of Tali et al. (2016), who reported that 22 % of study participants achieved the recommended leisure-time physical activity level. Similarly, only 28.8 % of adults in Madrid adhered to the recommendation (Meseguer et al., 2009). In contrast, the European Eurobarometer survey, compared the level of physical activity among different European countries, reported that about 74% of the Luxembourgish, 57% of the French and 60% of the Belgian population adhere to the WHO physical activity recommendations (Sjöström et al., 2006). It is well known that socio-demographic factors are the main determinants of psychological health

(Sartorius, Ustun and Costaetal, 1993). Among the sociodemographic factors related with levels of perceived stress, our study found a significant relation of age, gender and self-perceived financial status

while no significant differences in levels of perceived stress based on education level revealed.

The results revealed that age between 46-64 years are positively associated with high levels of perceived stress. These results were similar to those of Lesage et al. (2012), who reported that perceived stress being stronger as the participants get older. In contrast, Ganesh et al. (2018) found that the younger age were strongest predictors for high levels of perceived stress. Warttig et al. (2013) found that stress scores showed a tendency to decrease with age. Several theories offer reasons for this decline of stress with age, from the selectivity of positive aspects to reduced physical reactivity due to physical and health limitations.

The results revealed that females were 1.6 times more likely to have high levels of perceived stress than males. The reported higher level of stress among females is consistent with results of other studies in diverse countries (Barbosa-Leiker et al., 2013; Cohen, Janicki-Deverts and Miller, 2007). Importantly, women tend to report greater perceived stress than men, potentially because of their different roles in family life and work (Orth-Gomer, 2007). It is notable that changing gender roles, such as the increased participation of women in the professional arena, have already decreased the higher rate of stress of women manifestations compared to men. In this way, some studies, however, reported either no gender difference perceived stress levels in females than males.

In our study respondents who evaluated their financial status as worse than average compared to those who evaluated their financial status as average had 2.2 times higher risk of having high levels of perceived stress. These results confirmed previous studies showing a close relationship between stress and low income (Nielsen et al., 2008). The history of public health has shown that improving the economic circumstances of individuals can have a ripple effect through a variety of processes such as stress reduction and physical activity (Geiger, 2002).

In this study, educational level was not statistically significantly associated with levels of perceived stress. Mæhlisen et al. (2018) obtained a similar result. In contrast, Lunau et al. (2015) found consistent associations between lower education and higher levels of work stress. Fahey et al. (2016) found that low education was associated with higher levels of perceived stress in women of reproductive age. Educational level creates differences between people in terms of access to information and the level of proficiency in benefiting from new knowledge.

Our study had some limitations. The main limitation of our study was its cross-sectional design that does not allow definitive conclusions about causal relationships. Assessing leisure-time physical activity with self-reporting tools is cheap and easy, and has been validated in different countries, but it has the

inconvenience of relying on the subject's memory and honesty. It often results in overestimation. There are objective methods of assessing leisure-time physical activity, e.g., using pedometers and accelerometers that may provide data that are more accurate.

## Conclusion

Sedentary lifestyle and stress are risk factors for multiple adverse health outcomes, and thus major concerns in society today. Due to technological changes, physical activity, especially activity during working hours, has declined. Therefore, it is self-evident that leisure-time physical activity is increasingly important for achieving an adequate level of fitness and its associated health benefits. This study suggests that currently recommended weekly volume of  $\leq 1150$  minutes of leisure-time moderate physical activity has a protective role against high levels of perceived stress. An adequate level of physical activity appears to be particularly important for sociodemographic groups which are especially disadvantaged by high levels of perceived stress (persons aged between 46-64 years, persons with financial status as worse than average and females). Promoting the currently recommended volume of physical activity might be a good way to increase overall physical activity levels and reduce a perceived stress among population groups at risk for high levels of perceived stress, as well as the general population.

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