

Effect of physical exercises and perceived stress interaction on students' satisfaction with life

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Abstract

Purpose: to find out the effect of regular physical exercises and perceived stress interaction on students' satisfaction with life.

Material: The study involved university students ($n = 355$; $M_{age} = 19,97$; $SD = 2,12$). The moderator analysis was conducted according to the cross-sectional questionnaire.

Results: It is determined that the difference in students' satisfaction with life at the average and high perceived stress is due to physical exercises. The influence of the interaction of variables (physical activity x perceived stress) on satisfaction with life was statistically significant.

Conclusions: It is revealed the peculiarities of interaction between the physical exercises and perceived stress. The reduce of satisfaction with life under the influence of perceived stress is more typical for those students who do not regularly practice physical exercises. Physical exercises act as a buffer against stress.

Keywords: physical exercises, perceived stress, satisfaction with life, students.

Introduction

Satisfaction with life is a key indicator of subjective well-being [1], along with the predominance of positive affection over negative. It is defined as a cognitive process in which people value their satisfaction with life. The evaluation is based on a comparison of their life situation with their own set of standards [2]. It is a reflexive evaluation of how much everything has been and remains well. Satisfaction with life can be understood as a product of differences between achievements and aspirations. Satisfaction with life is related to the physical and mental health of a person. It can determine the level of human happiness lifetime [3].

The study of satisfaction predictors with life and the mechanisms for its support is always of considerable interest. Researches among students are especially relevant. Student's age is a period of active professional and personal self-determination. One of the criteria for the success of self-determination can be a high level of satisfaction with life.

Students are confronted with a number of difficulties in life. These are worries about success, perfectionist standards, uncertainty about their future, economic difficulties, family problems, and difficulties in dealing with the opposite sex. The period of study at the university predetermines the use of time and financial resources by students without the guarantee of a satisfactory return.

Such circumstances of life can be perceived by students as threatening. Therefore, they will cause stress (according to the transactional model of stress) [4]. University students are at a socio-demographic age, in which stress disorders are more prevalent [5, 6, 7]. The prevalence of depression, anxiety, and stress among

students from France, Romania and the Republic of Moldova was respectively 39.0%, 47.0%, 35.8% [8]. The high level of perceived stress stipulates the emergence of negative emotions: anxiety, depression. The analysis of publications over 20 years has shown that the average prevalence of depression among students is 31%. It is much higher than in the general population [9]. Many of these disorders have high temporal stability. They can lead to long-term psycho-physiological changes. They increase the risk of cardiovascular disease. In some studies, there is a steady negative correlation between stress and quality of life in university students. It is expressed in the deterioration of their physical and mental health [10-12]. This fact is confirmed in another study [13].

These facts generated interest in methods applied to alleviate stress; to ways to maintain a good quality of life. One of the important ways to overcome stress among students is physical activity. There is plenty of evidence that regular physical exercise has a direct positive effect on health and satisfaction with life [14, 15, 16]. The study of Maher et al. [17] determines the connection between physical activity and sedentary lifestyle with life satisfaction in college students (from 18 to 25 years old). The authors found that an increase in daily physical activity and a reduction in the daily sedentary lifestyle could improve the satisfaction of college students' lives. M. Gerber, S. Brand, S. Herrmann, and others used objective data concerning physical activity. It is proved that active physical exercises are an important factor in stress management, pain perception and sleep quality [18]. However, the usual levels of physical activity were not associated with satisfaction with life in young people [19].

The direct effect of physical exercises on the general

satisfaction of life in a number of secondary analyzes is placed in question (for example, [20]). It is emphasized that personal characteristics and environmental features can mediate or mitigate this correlation.

The connection between stress and active exercise is also ambiguous. There are studies which didn't support this conclusion [21]. The majority of studies confirmed that stress is negatively associated with physical activity [22].

It is necessary to define the term "physical exercise" and distinguish it from the terms associated with it: physical activity; sport. Physical activity refers to the widest category that covers all types of human movements. Sport is an organized competitive physical activity. It is focused on the victories and performances at an elite level. Physical exercises are aimed at recovery and rest. These are structured and scheduled physical loads [23]. We define the term "physical exercises" as a sub-group of physical activity, which are planned and purposeful attempts to improve health and well-being.

Previous studies demonstrate a significant impact of perceived stress and physical exercise on student satisfaction with life. However, there are no studies devoted to the impact of these factors on the satisfaction of life in interaction. It is known that the study of the interaction effect allows to answer the question: "how?" or "under what conditions?" the predictive variable affects the dependent variable.

The hypothesis of research is the follows: the regular exercise is a buffer between perceived stress and student satisfaction.

The purpose of the study is to find out the interaction effect of regular physical exercises and perceived stress on student satisfaction with life.

Material and methods

Participants. The sample consisted of 355 university students (men - n = 154, women - n = 201, age 17-26, average age - 19.97 years, SD = 2.12) (Kharkiv and Odessa, Ukraine). Participants were selected using a random sample. Before the study, all students were informed about the content of the questionnaire. Students were informed that participation is voluntary and confidential.

Design of the research:

Psychological and socio-demographic indicators were obtained using questionnaires. Students' questionnaire surveys were conducted in groups up to 20 persons. The survey lasted approximately twenty minutes. All scales meet requirements standards of psychometric quality.

It was applied Ukrainian translation of the scale of satisfaction with life for evaluation satisfaction with life (SWLS; [24]). It consists of five points. Typical questions: "I'm satisfied with my life" or "The actual living conditions are the best." Students were asked to indicate their degree of agreement with five statements on the 7-point Likert scale (from 1 = "totally disagree" to 7 = "totally agree"). The higher is the amount of points, the more people consider themselves happy and satisfied with

their lives. In this study, this scale was demonstrated by Alpha Cronbach 0.752.

Stress was measured on a perceived stress scale (PSS; [25]). This is a 10-point instrument that measures the perception of stress. Participants were asked to choose how often they felt certain feelings and thoughts during the last month. It was used 5-point Likert scale in the range from 0 (never) to 4 (very often). Examples of questions: "How often have you been worried the last month because of unforeseen events?", "How often did you feel nervous tension or stress last month?"

The four points (4, 5, 7, 8) were reciprocal. Therefore, these points were inverted. The final score was obtained by summing all the marks by 10 points. Higher scores point to a higher level of perceived stress. Ukrainian translation of the PSS was applied in this study. The coefficient of internal consistency was 0.836.

The regularity of physical exercises was evaluated with the help of the question: "Do you practice physical exercises for at least an hour and at least three times a week?". Consent was encoded as "1", and disagreement – as "0".

Statistical analysis: Descriptive statistics (average values, standard deviations) and correlations between variables are calculated. The moderator analysis was conducted on the basis of regression analysis. All calculations were made applying SPSS version 19.0. The analysis of the interaction effect was carried out applying the PROCESS macros ([26]).

Results

Descriptive statistics, correlations between regular exercise physical activity, level of perceived level of stress and satisfaction with life students are shown in Table 1.

Table 1. Descriptive statistics and correlations of the analyzed variables

Variables	M	SD	Y	X	M
Satisfaction with life (Y)	16.32	5.27	1		
Perceived stress (X)	18.23	6.16	-.565***	1	
Physical exercises (M)	.52	.50	.296***	-.087	1

Note. *** p < 0.001.

Perceived stress (Table 1) negatively correlates with satisfaction with life ($r = -0.565$; $p < 0.001$). The regularity of exercises correlates positively with life satisfaction ($r = 0.296$; $p < 0.001$). It wasn't detected the interrelation between perceived stress and physical exercises.

The results of regression analysis are presented in Table 2 in the general regression model of life satisfaction with centered perceived stress (X), $Y = -0.557X + 2,628M + 0.215XM + 15,080$. The regression model explains 39.5% of the dispersion of life satisfaction ($F_{(3; 351)} = 76.513$; $p < 0.000$).

In a regression model $Y = i_1 + b_1X + b_2M + b_3XM$ b_1 and b_2 are conditional effects [26]. These coefficients of regression estimate the effect of X when $M = 0$ and the influence of M when $X = 0$, respectively.

The coefficient of regression for the variable of physical exercises is $b_1 = 2,628$. It is statistically different from zero ($p < 0.000$). This is the predicted difference in the satisfaction with life between active students (regularly practice physical exercises) and passive students (having zero according to the scale of perceived stress, $M = 0$). The coefficient is positive. It means that inactive students ($X = 1$), satisfaction with life is higher.

The regression coefficient for the perceived stress scale is $b_2 = -0.557$. It is also statistically significantly different from zero ($p = 0.000$). This is the predicted difference in the satisfaction with life between two passive students, which differ in one unit in their perception of stress ($X = 0$). The sign is negative.

The regression coefficient for physical exercises and perceived stress is $b_3 = 0.215$. This coefficient quantifies how changes the effect of physical activity on the satisfaction with life changes with the perceived stress per standard unit. Here b_3 statistically significantly differs from zero ($p = 0.003$). This means that the effect of physical activity on satisfaction with life depends on the interaction of perceived stress and physical exercises. An increase in perceived stress per unit leads to a difference in the satisfaction with life between passive and active students (by 0.215 units).

In fact, reducing the satisfaction with life under the influence of perceived stress is refracted through physical exercises. Active students are less inclined to reduce satisfaction with life under the influence of stressful circumstances of life. When one variable reduces the influence of another variable on the criterion, this variable buffers the influence of another variable. In our study, the role of a buffer variable plays the regularity of exercises.

Table 2 demonstrates the inclusion of the interaction increases R^2 by 0.021. Interaction is 2.0% of dispersion in satisfaction with life, without conditional effects [$F_{var}(1.351) = 8.956, p = 0.003$]. It may seem like a small value. However, it is the order that can usually be found

in behavioral research. Fig. 1 shows that the effect of buffering is really strong.

Discussion

In the presented study, the relationship between regular exercise with physical activity perceived stress, and student satisfaction is considered. In previous studies, we studied basically separate links between stress and physical activity, or stress and satisfaction with life, or physical exercise and life satisfaction. We studied the relationship between these three constructs. We hypothesized that regular exercise would be a kind of buffer. He softens the relationship between perceived stress and student satisfaction. Our hypothesis was confirmed. It was found that the effect of the interaction of physical exercises and perceived stress on satisfaction with the life of students is statistically significant.

Other researchers have shown the relationship between physical exercise and stress indicators. In this study, there was no significant association between exercise and perceived stress. It coincides with some studies [21, 22]. Non-consistency of the results may be due to some factors and conditions of research. The research involved people of different ages. The physical exercises of different types and intensity were also applied.

In general, the positive effect of the interaction of physical exercises and stress can be explained both at the level of physiological and psychological factors. So, physical activity can significantly increase the production of serotonin and endorphins in the brain. It contributes to a sense of well-being. Physical exercises contribute to the new growth of neurons in the adult's brain, especially in the hippocampus [27]. As a result, it is reduced the feeling of anxiety and depression.

Psychological explanation of the positive effect of regular physical exercises meet the psychological needs of the person. It is about the need to increase self-efficacy, achievement of mastery, overcoming alienation, strengthening the autonomy and enhancing belonging. Satisfaction of such needs affects the satisfaction of various spheres of life, which contributes to the satisfaction with life in general [28]. Our previous studies

Table 2. Regression analysis of satisfaction with life (Y) as a function of perceived stress (X) and physical exercises (M), n=355

Dependent variable: Y – satisfaction with life						
Predictors	Coefficient	SE	t	p	95% confidence interval	
					low	up
Constant	15.080	.308	49.031	.000	14.475	15.685
X	2.628	.438	5.996	.000	1.766	3.490
M	-.557	.047	-11.791	.000	-.650	-.464
X×M	.215	.072	2.993	.003	.074	.357
Increase R^2 due to interaction						
X×M	R^2 -var.	F	df1	df2	p	
	.021	8.956	1	351	.003	

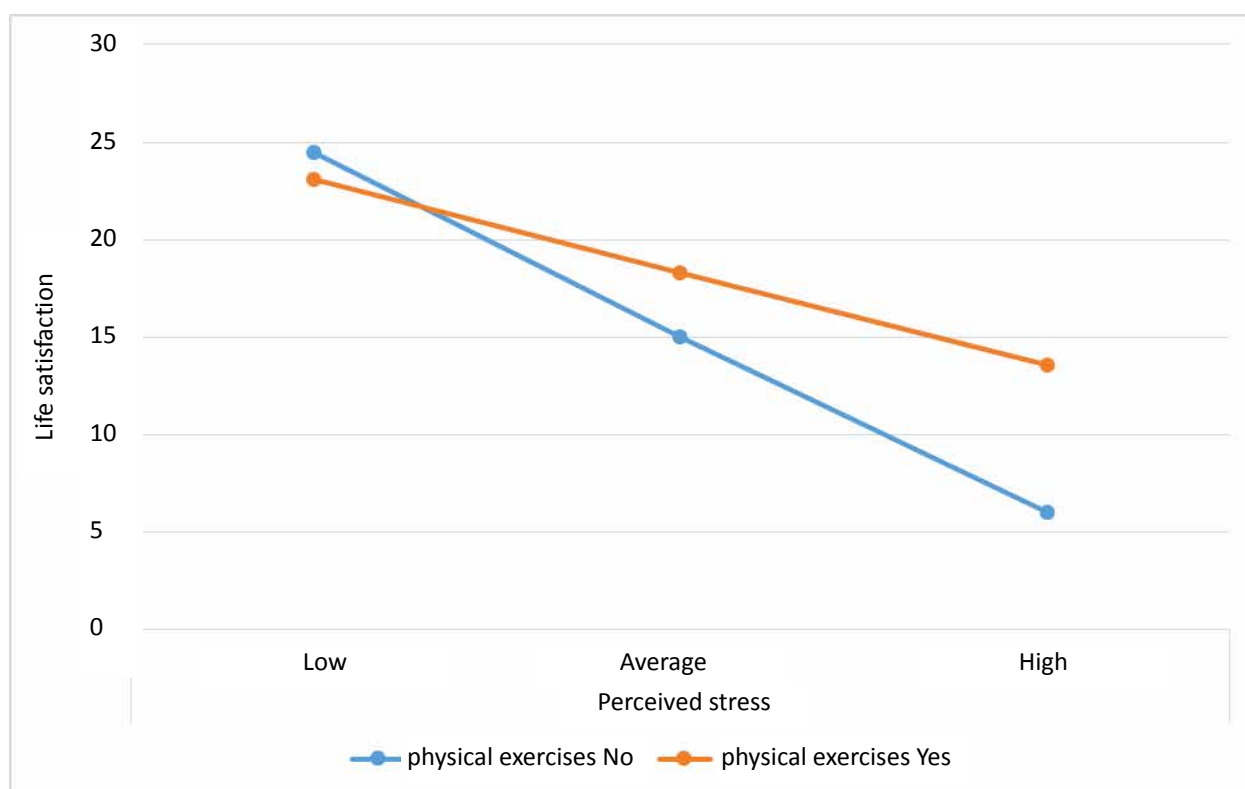


Fig. 1. Regression of satisfaction with life on physical exercises at three levels of perceived stress.

[29, 30] determined that people with a high index of personal resources (self-efficacy, self-control, viability, and optimism) are more capable to manage potential threats. They feel a lower level of excitement or anxiety, stress in the form of burnout. These personal resources are flexible and forming during life. Therefore physical exercises can be an effective means for their purposeful correction and formation. In addition, physical exercises can affect the quality of life. They provide opportunities to satisfy peak moments [31].

This study is expanding previous studies. This study evaluates the effect of physical activity and perceived stress with students' satisfaction with life.

The results of this study deserve attention. But there are certain limitations that can be leveled out in future studies. Firstly, the participants of this study were only young age students. Therefore, the result can not be generalized to the entire adult population.

Secondly, current results do not foresee causal relationships between perceived stress, physical exercises, and satisfaction with life (this study was cross-sectional). The prospect of further research is to carry out research on longitudinal plans. They could help to establish causal

relationships between physical exercises, perceived stress, and life satisfaction.

Conclusions

Thus, the obtained results confirm the hypothesis that physical exercises act as a buffer against the stress. They contribute to satisfaction with life at university students. The revealed features of the interaction of physical exercises with perceived stress are expressed in the fact that reducing the satisfaction of life under the influence of perceived stress is more characteristic of passive students (practice physical exercises not regularly). It is required the development of targeted activities among the university students. Such actions should be directed at the promotion and organization of physical exercises. The urgent task is to conduct long-term studies. The basis of such studies is objective indicators of motor behavior. It will help to extend the information about their impact on the quality of life of students.

Conflict of interest

The author declares that there is no conflict of interests.

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