

ANALYSIS ON THE STRESS RELIEF OF COLLEGE STUDENTS BY PHYSICAL EXERCISE

Shu Qiao¹ & Gaosong Huang^{2*}

¹Institute of Physical Education, Liaoning Shihua University, Fushun 113001, China

²Institute of Physical Education, Huanggang Normal University, Huanggang 438000, China

SUMMARY

Introduction: In college, students have to face not only the changes of their own physical development, but also external pressures from environmental adaptation, interpersonal communication, academic achievement, economic hardship, emotional predicament and employment difficulties. In addition, the physical and mental development of college students is not yet mature. Their self-regulation ability is relatively weak, and the resulting psychological problems become more and more obvious. It has long been proven that physical exercise can promote individual physical and mental health, but the specific relationship between the two needs further research.

Subjects and methods: The paper adopts the random sampling method. 300 subjects were randomly divided into six groups with different exercise programs. Those subjects were tested via PSTR for eight times within two months. Using SPSS27.0 as statistical analysis tool, the effect of physical exercise on stress relief of college students was analyzed from two aspects of daily exercise time and continuous exercise days.

Results: Before and after the experiment, the pressure level of group one to group five decreased significantly. The pressure level of group four decreased the most ($t = 51.595, P < 0.001$). Group three came second ($t = 30.569, P < 0.001$). And the pressure level of group one decreased relatively lower ($t = 14.861, P < 0.001$).

Conclusions: Physical exercise has a positive effect on stress relief of college students. Daily exercise time should be suitable in length, and it should be 30 min to 45 min.

Key words: physical exercise - college students - mental stress - relief effect

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INTRODUCTION

Stress, also known as pressure, was first proposed by Canadian physiologist Hans Selye in 1936. He considers stress to be a state with specific symptoms, which consists of nonspecific changes in the physiological system under stimulation (Lennartsson et al. 2013). Stress is necessary for human survival and development. Moderate stress is a required condition for maintaining normal physical and mental functions. It is essential for maintaining normal physical and mental functions and coping with life. But excessive stress, if not handled properly, can be detrimental to physical and mental health (Bartlett et al. 2016).

It is a transitional stage from adolescence to adulthood during college, as well as a specific stage from campus life to social life for students (Uliaszek 2021). They have to face not only the changes of their own physical development, but also external pressures from environmental adaptation, interpersonal communication, academic achievement, economic hardship, emotional predicament and employment difficulties. (Zhao & Campus 2006). The physical and mental development of college students is immature and their self-regulation ability is relatively weak. So, when dealing with relatively complex problems they often have strong psychological conflicts, which would cause greater psychological pressure (Bayram & Bilgel 2008). Excessive or prolonged stress can

lead to psychological disorders including anxiety, restlessness, and depression. Studies have shown that many diseases, such as coronary heart disease, high blood pressure, hypoglycemia, etc., are related to long-term psychological stress. Nowadays, research on the stress of college students has become a practical problem and the focus of public concern. (Fuente et al. 2020).

It has long been proven that physical exercise can promote individual physical and mental health. How to better promote individual mental health through physical exercise has always been a hot topic in the field of sports and psychology (Cocca et al. 2020). The results of relevant experimental studies have shown that regular physical activity reduces the number or sensitivity of adrenergic receptors, which can lower heart rate and blood pressure. Compared with means such as entertainment and music appreciation, physical exercise can promote individual recovery from intense stressful situations more effectively (Jewett et al. 2014). Both a single exercise and a long-term one can significantly improve the situation of anxiety, depression and other negative emotions caused by stress. It can be seen that physical exercise is an important factor affecting and relieving psychological stress. This research conducts an in-depth study on the internal relationship between physical exercise and the stress of college students. Through experiments, the paper focuses on the effect of time factor in physical exercise on stress relief of

college students. (Sutcliffe et al. 2021).

SUBJECTS AND METHODS

Research objects

This study selected 300 college students from Liaoning Province as the research objects, including 156 males and 144 females, with an average age of 21.11 ± 1.12 years old. All participants were informed and agreed to the related information including research background, research scheme, and questionnaire contents.

Research tool

- (1) Sojump (For data collection)
- (2) Excel 2019 (For data registry)
- (3) SPSS27.0 (For data analysis)

(4) PSTR stress test scale. The scale was compiled by Swiss psychologist Edworth in 1983 and based on the psychological stress factor theory proposed by German psychologist Murray in 1968. According to Dr. Murray, moderate stress helps to improve work efficiency. But excessive pressure can be counterproductive at work, and in the worst cases, it can affect physical health.

Research program

The paper adopts the random sampling method. 300 subjects were randomly divided into six groups, 50 people in each group. Among them, the control group did not do physical exercise. Group one did exercise for less than 15 min each time. Group two for 15-30 min, group three for 30-45 min, group four for 45-60 min, and group five for more than 60 min. The experiment lasted for two months. Related data tests were conducted by the PSTR stress test scale every other week. After excluding extreme data, the arithmetic mean of PSTR scores was taken for registration. A total of eight *t*-tests were performed in the entire experimental procedure. With the data, mental stress relief effect of physical exercise on college students was analyzed from two aspects of daily exercise time and continuous exercise days by SPSS27.0.

RESULTS

After the test and the original data were obtained, the abnormal data greater than $\mu + 3\sigma$ or less than $\mu - 3\sigma$ were removed according to the Rajda criterion. The deviation and standard deviation of the remaining values were recalculated and reviewed until the deviation was less than 3σ . The recorded data are shown in Table 1.

Table 1. PSTR score for control time variables

	Week one	Week two	Week three	Week four	Week five	Week six	Week seven	Week eight
Control Group	80	80	81	79	80	79	79	80
Group one	82	81	81	80	78	78	76	75
Group two	79	78	76	75	71	68	67	67
Group three	84	83	80	75	71	68	67	66
Group four	78	78	75	70	65	63	60	58
Group five	79	78	76	72	68	65	64	63

The overall average score of the PSTR stress test scale is 54, and each score interval is separated by half a standard deviation. Generally, a score greater than 93 indicates that the stress response seriously harms the individual's health and the help from a professional psychotherapist is required. Score of 82-92 indicates that the level of stress is too high, which is causing damage to personal mental health and problems in interpersonal relationships. Score of 71-81 indicates that the level of stress is medium, which may be starting to be detrimental to health, and the subject needs to reflect on how to handle stress. Score of 60-70 indicates that the amount of excitement and stress in life is quite moderate. There might be occasional excessive stress, but the subject can quickly return to a calm state. It causes no physical health threats. Score of 49-59 indicates that the subject can control his response to stress. He can

get along with others, and perform daily studies and work with no difficulties. Score below 48 indicates that the subject remains unmoved or indifferent to stress. This causes no negative impact on health, but might lead to loss of interest or motivation in life.

As shown in Table 1, before the experiment, the PSTR scores of the students are mainly distributed in the range of 71-92. The degree of stress is too high, and they are in a stage that may or are causing adverse effects on their mental health. After two months of physical exercise, except for the control group and group one, the PSTR scores of the other groups decreases significantly. The change of the PSTR score of the control time variables is shown in Figure 1, and the correlation coefficient between the arithmetic mean score and time of each group is shown in Table 2.

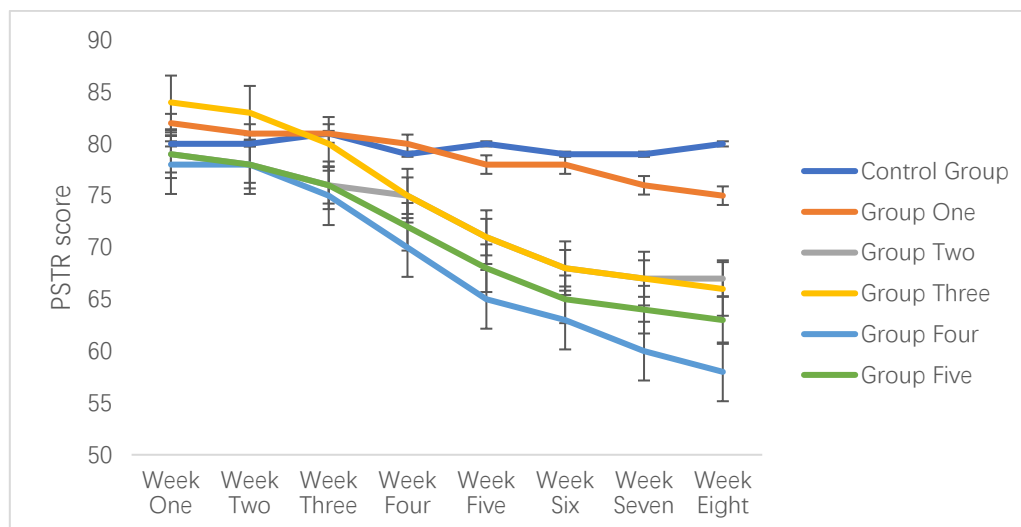


Figure 1. Line chart of PSTR score for control time variables

According to Table 1 and Table 2, the PSTR score of the control group hardly changed during the experiment. It indicates that the data has no significant correlation at the confidence level of 0.05 ($P = 0.310 > 0.05$). This is as expected. While, the data of Group One are significantly correlated at the 0.01 level ($P = 0.006 < 0.01$). The data of group two to group five are significantly correlated at the 0.001 level ($P < 0.001$). This indicates that during the two-month experiment, the stress levels of group one to group five all dropped significantly. But the effectiveness of group one is relatively inferior to the other four experimental groups.

Table 2. Correlation coefficient between PSTR score and time

	<i>n</i>	Correlation	<i>Sig.</i>
Control group	8	-0.412	0.31
Group one	8	-0.859	0.006
Group two	8	-0.977	0
Group three	8	-0.979	0
Group four	8	-0.986	0
Group five	8	-0.982	0

PSTR score of the experiment is collected and analyzed by SPSS27.0. The descriptive statistical results are shown in Figure 3. Paired sample *t*-test is conducted between the control group of the last *t*-test (the eighth test) and each experimental group. The results were shown in Table 4.

Table 3. PSTR score description statistics

	Range	Minimum	Maximum	Std. deviation	Variance
Control group	2	79	81	0.70711	0.5
Group one	3	79	82	0.91613	0.839
Group two	12	67	79	4.9839	24.839
Group three	18	66	84	7.32413	53.643
Group four	20	58	78	8.01672	64.268
Group five	16	63	79	6.50137	42.268

Table 4. *t*-test of paired samples of control group and experimental groups

	Mean	Std. Deviation	Std. Error mean	95% Confidence interval of the difference		<i>t</i>	<i>Sig.</i> (2-tailed)
				Lower	Upper		
Group one	5.091	1.136	0.343	4.328	5.854	14.861	0.000
Group two	13.273	1.737	0.524	12.106	14.440	25.339	0.000
Group three	13.727	1.489	0.449	12.727	14.728	30.569	0.000
Group four	22.000	1.414	0.426	21.050	22.950	51.595	0.000
Group five	17.000	0.775	0.234	16.480	17.520	72.790	0.000

According to Figure 4, *t*-test of paired samples is performed on the data of control group and five experimental groups. The specific results are as follows: group one, 95%CI: 4.328-5.854, $t = 14.861$, $P < 0.001$; group two, 95%CI: 12.106-14.440, $t = 25.339$, $P < 0.001$; group three, 95%CI: 12.727-14.728, $t = 30.569$, $P < 0.001$; group four, 95%CI: 21.050-22.950, $t = 51.595$, $P < 0.001$; group five, 95%CI: 16.480-17.520, $t = 72.790$, $P < 0.001$. There are significant differences in the data of each group on the basis of 0.001 confidence. This indicates that the stress level of students has changed significantly before and after the experiment. According to the data in Figure 3, the variances of each group in the descriptive statistics are expressed as σ_1 - σ_5 respectively. The result can be obtained as $\sigma_4 > \sigma_3 > \sigma_5 > \sigma_2 > \sigma_1$. This indicates that group four has the highest decline in the pressure index, followed by group three, and group one has a relatively low decline in the pressure index.

DISCUSSION

According to the above experimental data, it can be seen that physical exercise has a positive effect on stress relief of college students. First of all, in general, in two weeks after exercise, the stress relief effect of the students is not obvious, and the situation improves in the third to sixth weeks. At this stage, the effect of exercise on psychological stress relief is greatly improved. After more than six weeks, such an effect gradually weakens. The pressure of students at this time basically reaches the normal standard, but still higher than the standard value. This is an inevitable phenomenon. While exercise can relieve the psychological stress of the students, the overwhelming stressors faced by the student population today are impossible to eliminate. Therefore, the current situation of excessive stress can only be improved rather than eliminated.

Also, according to the experimental results, the stress relief effect is best when the daily exercise duration is 45 min to 60 min. This shows that continuous exercise for a long time is the primary way to relieve stress. But the exercise time cannot be too long. The data shows that after 60 min of exercise a day, there is a slight decrease in stress relief. Nowadays, students are increasingly busy with study and life, and it is difficult for them to devote more than an hour to exercise. So, it is not recommended. Too short exercise time (less than 15 min) has a certain effect, but the result is quite poor. So, it is not recommended either for stress relief purposes. Comparatively, exercise of 30 min to 45 min, not only ensures good effect on stress relief, but also can relatively save time, is the most suitable solution.

CONCLUSIONS

This study explores the influence of the time factor

in exercise on the stress status of college students, and reveals that physical exercise is an important factor in their stress relief. The cognitive theoretical model of stress believes that the generation of stress depends on the individual assessment of the situation and their own resources. Individuals would reduce stress coping ability due to control-losing, nervousness, or anxiety, and show weaker mental resilience (Steiner et al. 2003). Previous research points out that the senses of control and value are important internal resources to reduce individual risk factors. And physical exercise can increase the psychological resource, thereby promoting the individual psychological resilience (Donohue et al. 2019). The stress process model believes that the core of stress relief is to develop coping resources. Mental resilience can be used as a coping resource to relieve academic stress, and physical exercise is an effective way to improve resilience and develop coping resources (Dowell et al. 2021). College students with regular physical exercise can obtain more internal resources in academic activities. It is of great importance to improve mental resilience and relieve the academic pressure of college students in the process of dealing with an unbalanced state. This can help college students achieve a new balance of body and mind, and then promote their mental health (Fossati et al. 2021).

As mentioned above, although exercise can relieve the stress of college students, it cannot solve their intensive pressure problems. The solution of these problems requires the joint efforts of schools and relevant government departments (Garriott & Nisle 2018). Schools should reinforce the monitoring and management of teaching quality, continuously improve the quality of education and teaching, and attach great importance to the psychological problems of students. Once students with psychological problems are noticed, psychological counseling should be carried out in time, and attention should also be paid to them (Tubic 2019). Colleges and school psychological counseling departments should give full play to their professional advantages, and adopt both online and offline methods for psychological communication in order to reduce students' psychological pressure. Relevant departments should enhance employment and entrepreneurship guidance and improve relevant policies. Government should work with schools and make use of employment and entrepreneurship classes to enable students to master basic job-hunting skills. By doing so, students would cultivate entrepreneurial consciousness and improve entrepreneurial quality and ability for the success of employment and reduction of their employment pressure (Amanvermez et al. 2020).

Due to the limited time and conditions, there must be some inadequacies in this study. For example, the stress situations vary among the college students from different grades yet the research did not elaborate in

this regard. Moreover, the total time span of the research is only two months. Although most of the situation has been considered, there may still be new discoveries if more data can be collected based on a longer period of observation.

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Contribution of individual authors:

Shu Qiao: wrote original draft, participated in literature search and analyses, evaluations and manuscript preparation, as well as wrote the paper.

Gaosong Huang: conceived and designed the manuscript, interpreted the data, and participated in project administration including resources, software, validation, visualization, conceptualization, investigation and methodology.

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Correspondence:

Gaosong Huang, PhD

Institute of Physical Education, Huanggang Normal University

Huanggang 438000, China

E-mail: hgs134679@126.com