

# Effects of Different Exercise Intensity on Mental Health and Self-Efficacy of Obese College Students

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## ABSTRACT

In recent years, due to the lack of compulsory constraints in physical education, many college students have reduced physical exercise, therefore, the obesity symptoms of college students have become increasingly prominent. In addition, the lack of physical exercise causes other healthy issues of college students as well. This paper explores the influence of different exercise intensity on obese college students through empirical research. The results showed that under the condition of voluntary participation in exercise, high-intensity exercise significantly improved the mental health of obese college students, and medium-intensity exercise significantly improved the self-efficacy of obese college students than high-intensity exercise.

**Keywords:** exercise intensity, obesity, mental health, self-efficacy, college students

## 1. Introduction

In recent years, by the nationwide survey of students physical health, the government found that college students' physical health has become a prominent problem. The incidence of obesity among college students has increased rapidly, from around 3% in 1995 [1] to around 9% in 2010 [2]. The incidence of obesity among college students has increased year by year, affecting the daily life, physical health and physical exercise of college students. Physical health problems tend to have a negative impact on mental health [3]. Due to the relatively large pressure on the appearance of obese college students in life, they have lower frustration resistance and mental toughness, which is not conducive to the development of good mental health [4]. Taking exercise with a certain intensity for obese people can effectively speed up their internal energy consumption, promote metabolism and consume fat, which is an effective way to reduce the weight level of obese college students, and to improve the mental health level of obese college students.

It is likely to be an effective way to improve the psychological health of obese college students and their psychological quality by exercising with different exercise intensity. Therefore, understanding the development law of mental health status and self-efficacy of obese college students in a short period of time through different exercise intensity can provide a theoretical basis for mental health education of obese college students' intensity, so as to promote the development of their mental health.

## 2. Research Objects and Methods

### 2.1 Research Objects

A total of 90 freshmen and sophomores (45 boys and 45 girls) with simple obesity from two universities in Yunnan Province were selected as the objects of study. According to the document "asia-pacific outlook: redefining obesity and its treatment" released in Hong Kong by the international committee composed of well-known experts on obesity in the asia-pacific region [5]. According to the definition of obesity in the asia-pacific region (China), a BMI greater than 25kg/m<sup>2</sup> is considered as overweight, and a BMI greater than 28kg/m<sup>2</sup> is considered as obese. However, Fan Lianxiang and some professors determined in the study of domestic population that when a BMI is greater than 23kg/m<sup>2</sup>, a young woman's body shape is considered as obese [6]. Therefore, the definition of obesity varies in different periods. At present, according to the standards of the world health organization, a BMI of more than 30kg/m<sup>2</sup> is considered as obese. But considering the physiological characteristics of women and the intensity of the exercise and other factors, the BMI of more than 28kg/m<sup>2</sup> for girls and the BMI of more than 30kg/m<sup>2</sup> for boys were selected as the subjects of this exercise experiment.

## 2.2 Research Methods

### 2.2.1 Questionnaire survey

The general self-efficacy scale (GSES) and symptom self-rating scale (SCL -- 90) were used in the questionnaires, which were distributed in three times. The first survey was distributed before the exercise intervention, the second survey was distributed 6 weeks after the exercise intervention, and the third survey was distributed 12 weeks after the exercise intervention.

Self-efficacy was measured using the general self-efficacy scale (GSES) developed, translated and revised by Schwarzer and some professors. There were 10 questions in the scale. Likert4 scoring method was adopted. The higher the total score of the subjects was, the higher the sense of self-efficacy was. According to the statistics, the absolute values of skewness were 0.045 ~ 0.848, the absolute values of kurtosis were 0.127 ~ 1.248, Cronbach's Alpha was 0.816, and the fractional half-reliability was 0.794. The correlation between the 10 questions and the total score was between 0.518 and 0.724.

### 2.2.2 Experimental methods

In order to achieve the accuracy of the experiment, 90 students (60 and 30 respectively) who were simply obese were selected from two universities because they were obese according to BMI and could not be satisfied in one university. Because the exercise intensity of the exercise group with large exercise intensity is relatively high, students in this group are required to exercise by contract exercise mode under the condition of students' willingness. The requirements and methods of contract exercise are explained to students before exercise. The experimental subjects were divided into three groups (30 students in each group) : small exercise intensity group, medium exercise intensity group and large exercise intensity group. The intensity of the small exercise intensity group reached HRmax (50%-60%), the intensity of the medium intensity group reached HRmax (60%-70%), and the intensity of the large intensity group reached HRmax (70%-80%). The exercise methods of the moderate exercise intensity and the large exercise intensity exercise group were the exercise prescriptions of different exercise intensity formulated by the research team, and the exercise methods of the small exercise intensity group were the public physical education carried out by colleges and universities. The intervention time was 12 weeks, the exercise frequency was 2 times/week, and the exercise time was 45min/ time. After the exercise, the exercise intensity and exercise consciousness scale were adopted to conduct the exercise test on the students, so as to understand the students' exercise experience, so as to better grasp the exercise intensity, adjust the exercise plan appropriately, and ensure the exercise intensity within the experimental standard range.

### 2.2.3 Mathematical statistics

The members of the research group have been trained in sports experiment skills, and are familiar with the process of psychological test and matters needing attention. For data collection, questionnaires were sent out on site to fill in and collected, and SPSS22.0 statistical software was used to analyze the data. Descriptive analysis and variance analysis were used for statistical methods, and coefficient reliability analysis was used for questionnaires.

## 3. EXPERIMENTAL RESULTS

### 3.1 Comparison of scl-90 and GSES scores in each group before exercise

Before exercise, multiple comparisons of factors and total mean score of self-efficacy in the scl-90 test of obese college students in the small exercise intensity group, the medium exercise intensity group and the large exercise intensity group showed that the P values were all greater than 0.05, showing no statistical significance.

### 3.2 Comparison of scl-90 and GSES scores before and after low-intensity exercise

**Table 1** Comparison of scl-90 and GSES scores before and after low-intensity exercise

Test Project	Small exercise intensity group			The F value
	Exercise before	Exercise 6 weeks	Exercise 12 weeks	
Somatization	1.47±0.29	1.46±0.45	1.47±0.35	1.005
Forced symptoms	1.72±0.51	1.71±0.59	1.73±0.39	2.034
Interpersonal sensitivity	1.62±0.49	1.62±0.49	1.61±0.49	0.021
Depression	1.56±0.33	1.56±0.48	1.55±0.63	0.009
Anxiety	1.66±0.58	1.65±0.34	1.67±0.86	2.045
Hostile	1.35±0.49	1.33±0.46	1.34±0.51	2.482
Terrorist	1.38±0.34	1.38±0.28	1.38±0.47	0.001
Paranoid	1.44±0.52	1.42±0.64	1.43±0.54	1.248
Psychotic	1.43±0.48	1.43±0.57	1.42±0.44	0.054
Rest	1.49±0.36	1.48±0.22	1.49±0.56	0.004
Divide the total SCL90	1.51±0.44	1.50±0.45	1.51±0.52	0.027
Divide the total GSES	2.68±0.58	2.69±0.42	2.68±0.56	2.184

As shown in table 1. During 12 weeks of low-intensity exercise, Thirty obese college students are tested in three

periods, before exercise, the ending of 6 weeks' exercise and the ending of 12 weeks' exercise. Comparing and analysing the variance of each factor, it finds that P values were all greater than 0.05, so it's no significance. Therefore, it makes no difference for the psychological health and self-efficacy of college students to do low-intensity exercise.

### 3.3 Comparison of scl-90 and GSES scores before and after moderate intensity exercise

**Table 2** Comparison of scl-90 and GSES scores before and after moderate intensity exercise

Test Project	Moderate exercise intensity group			
	Exercise before	Exercise 6 weeks	Exercise 12 weeks	The F value
Somatization	1.44±0.22	1.39±0.35	1.38±0.33	13.458**
Forced symptoms	1.77±0.58	1.76±0.55	1.77±0.69	1.488
Interpersonal sensitivity	1.59±0.42	1.52±0.21	1.51±0.29	15.246**
Depression	1.51±0.35	1.49±0.33	1.49±0.39	4.025
Anxiety	1.69±0.51	1.66±0.55	1.64±0.59	9.158**
Hostile	1.39±0.44	1.38±0.39	1.39±0.42	0.489
Terrorist	1.33±0.38	1.33±0.34	1.34±0.33	0.568
Paranoid	1.44±0.55	1.43±0.38	1.44±0.41	0.488
Psychotic	1.41±0.45	1.36±0.42	1.35±0.58	13.259**
Rest	1.48±0.41	1.47±0.38	1.47±0.33	0.987
Divide the total SCL90	1.51±0.43	1.48±0.39	1.48±0.44	6.587*
Divide the total GSES	2.66±0.54	2.70±0.41	2.72±0.35	19.188**

As shown in table 2. Thirty obese college students have finished moderate intensity exercise for 12 weeks. Analysing the three times of SCL - 90 and GSES test results, GSES F values of these four factors like somatization, interpersonal sensitivity, anxiety and psychoticism are: 13.458, 15.246, 9.158, 13.259, 19.188. P values were less than 0.01. There are significant differences. The P value of scl-90 were less than 0.05. There were significant differences.

**Table 3** comparison of scl-90 and GSES scores before and after exercise with great intensity

Test Project	High intensity group			The F value
	Exercise before	Exercise 6 weeks	Exercise 12 weeks	
Somatization	1.45±0.25	1.32±0.35	1.30±0.33	23.158**
Forced symptoms	1.75±0.48	1.74±0.37	1.73±0.44	3.158
Interpersonal sensitivity	1.61±0.39	1.49±0.37	1.44±0.21	33.485**
Depression	1.54±0.39	1.42±0.49	1.43±0.39	24.185**
Anxiety	1.67±0.52	1.56±0.46	1.56±0.35	13.488**
Hostile	1.37±0.41	1.36±0.58	1.35±0.55	3.489
Terrorist	1.35±0.42	1.33±0.42	1.33±0.39	4.158
Paranoid	1.44±0.45	1.43±0.44	1.42±0.51	3.188
Psychotic	1.42±0.53	1.31±0.45	1.32±0.55	18.188**
Rest	1.49±0.37	1.48±0.38	1.47±0.29	2.185
Divide the total SCL90	1.51±0.14	1.44±0.43	1.43±0.41	11.235**
Divide the total GSES	2.67±0.57	2.74±0.77	2.73±0.61	25.414**

As shown in table 3. Thirty obese college students have finished vigorous exercise for 12 weeks. According to the one-way ANOVA of scl-90 and GSES test results, the P values of somatization, interpersonal sensitivity, depression, anxiety, psychosis, scl-90 and GSES were all less than 0.01, having shown significant differences.

### 3.4 Effects of different exercise time and intensity on test scores of scl-90 and GSES

The results of the scl-90 test and GSES test were analyzed by two-factor variance analysis for different exercise duration and exercise intensity, to reflect whether the differences between the two factors were significant, and to identify the main factors influencing the mental health and self-efficacy of obese college students. From the results of variance analysis of double factors, exercise time for obese college students' mental health and had no direct influence self-efficacy, data do not exist significant differences, exercise intensity factor significance level of the P value is less than 0.05, so you can judge for obese college students' mental health and exercise intensity self-efficacy exist significant difference.

#### 4. DISCUSSION

College students is a youth group. They are physical mature but mental at their ages. And their college life and learning in the open. Under the relatively small constraints, the students in this period of mental conflict, prone to psychological problems, but obesity as a weak constitution of college students mental health status in college students has caught the attention of many. A number of research results show that physical exercise of different intensity has a positive impact on students' mental health, and can improve students' physical performance, athletic level and physical quality, and correctly recognize that deepening exercise intensity is conducive to physical and mental health [7,8]. This study found that after 12 weeks of exercise intervention with different exercise intensity, the scl-90 total average score and some factors of the obese college students in the moderate and high exercise intensity exercise group decreased, but the mental health of the exercise group with low exercise intensity did not improve. Through the observation of the exercise process of the small exercise intensity group at ordinary times, it was found that due to the low exercise intensity, the students could complete the exercise task arranged by the teacher, and seldom showed pleasant psychological feelings after completing the exercise and winning, and there was a lack of communication between the students during the rest process. Exercise task is easy to complete, students can not play their potential, lack of encouragement and support from peers and teachers, resulting in the small exercise intensity exercise group of obese college students mental health level has not been significantly improved.

There is statistical significance between the mental health factors of obese college students and the mental health factors before exercise in the moderate exercise intensity exercise group and the large exercise intensity exercise group, indicating that there is a certain difference between the mental health factors of obese college students in the moderate exercise intensity exercise group and the large exercise intensity exercise group. Through the analysis of the dual factors of different intensity and different exercise time on the mental health of obese college students, it can be seen that 6 weeks of exercise and 12 weeks of exercise have no direct impact on the mental health, while exercise intensity is the main factor affecting the mental health of obese college students. Combined with the multiple comparative analysis of students' mental health after 12 weeks of exercise with different exercise intensity, the effect of exercise with large exercise intensity on mental health is better than that of exercise with medium exercise intensity. This conclusion is different from the conclusion proposed by hu qiquan [9] that for some groups such as female students, high-intensity physical exercise cannot overcome physiological obstacles, but will have certain negative effects. Because this study before the implementation of high intensity exercise, the obese students exercise signed a contract for the group, as a result, the conclusion is also confirmed Zou Wen etc. [10] research: the different exercise intensity differences of

adolescent mental health intervention effect, medium strength in and to improve the mental health level of exercisers more effectively. To sum up, under the circumstance that obese college students voluntarily participate in physical exercise and have a clear understanding of the purpose of physical exercise, the influence of large intensity exercise on mental health of obese college students should be attributed to moderate intensity exercise. May be because the big obese college students before the exercise intensity exercise group were holding the purpose of the exercise to lose weight, and the students in the process of exercise intervention after the exercise is more difficult task of pride, pleasant feelings, at the same time, in the process of exercise task can be helping each other, eliminate the suspicion, hostility between each other and exclusion of psychology, to establish a friendship in the process of hard training, improve the physical and mental health has also been promoting.

General self-efficacy refers to an individual's overall confidence in coping with challenges of various environments and facing new things [11]. The study found that both the moderate exercise intensity exercise group and the large exercise intensity exercise group improved the self-efficacy of obese college students, while the analysis of the total mean score of GSES of obese college students in the small exercise intensity exercise group before and after exercise was greater than 0.05, showing no statistical significance. The research of wei qiang [12] shows that the exercise mode by contract can improve the self-efficacy level of college students with weak physique better than other exercise modes. Although the high-intensity exercise group was under the condition of voluntary exercise before exercise and implemented the contract-based exercise mode, the obese college students had no confidence in completing the high-intensity exercise task, resulting in that the self-efficacy level of the obese college students in this group was not better than that of the medium-intensity exercise group.

#### 5. CONCLUSION

To sum up, after carrying out moderate exercise intensity exercise and large exercise intensity exercise (contract exercise mode) on obese college students, the students' mental health level has been improved, mainly in improving the somatization, interpersonal sensitivity, anxiety and psychosis of obese college students. More significantly, the medium exercise intensity exercise and large exercise intensity exercise have improved the self-efficacy level of obese college students. Since the students in the large intensity exercise group take part in it on their own will and have a certain understanding of the exercise tasks and plans, they have a certain psychological preparation for completing the exercise tasks. Although the sense of self-efficacy has improved, the increase is similar to the medium exercise. Therefore, moderate intensity exercise is better than high intensity exercise in improving the self-efficacy of obese college students.

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