

EFFECTS OF MODERATE-INTENSITY PHYSICAL TRAINING ON STUDENTS' MENTAL HEALTH RECOVERY



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EFEITOS DO TREINAMENTO FÍSICO DE INTENSIDADE MODERADA SOBRE A RECUPERAÇÃO DA SAÚDE MENTAL DOS ESTUDANTES

EFFECTOS DEL ENTRENAMIENTO FÍSICO DE INTENSIDAD MODERADA EN LA RECUPERACIÓN DE LA SALUD MENTAL DE LOS ESTUDIANTES

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ABSTRACT

Introduction: Moderate-intensity physical training effectively improves physical fitness and promotes an important impact on restoring human mental health. **Objective:** This study aims to explore the effect of moderate-intensity physical training on students' mental health. **Methods:** 100 students presented themselves as research volunteers. The moderate-intensity sport the students played was badminton. Each exercise lasted 30 minutes. A scale was used to detect the students' emotional changes after exercise. Different intensity exercise programs were formulated according to the improvement in the student's mood. The mechanism of the impact of moderate-intensity exercise on mental health was also compared. **Results:** Students' emotional state before the exercise intervention was affected by physical exhaustion. After the exercise intervention, the emotional state of college students was shown to be more resilient to physical exhaustion. The dynamic changes in students' states before and after the intervention were statistically significant ($P < 0.05$). **Conclusion:** Moderate-intensity sports positively affect students' mental health recovery. **Level of evidence II; Therapeutic studies - investigation of treatment outcomes.**

Keywords: Healthy Lifestyle; Aerobic Exercise; Sports; Psychological Distress.

RESUMO

Introdução: O treinamento físico de intensidade moderada é uma forma eficaz de aperfeiçoar a aptidão física além de promover um impacto importante na restauração da saúde mental humana. **Objetivo:** O objetivo deste estudo é explorar o efeito do treinamento físico de moderada intensidade sobre a saúde mental dos estudantes. **Métodos:** 100 estudantes apresentaram-se como voluntários de pesquisa. O esporte de intensidade moderada que os estudantes praticam foi o badminton. Cada exercício teve duração de 30 minutos. Uma escala foi utilizada para detectar as alterações emocionais dos estudantes após a prática do exercício. Formulou-se diferentes programas de exercícios de intensidade de acordo com a melhoria do humor do estudante. O mecanismo do impacto do exercício de intensidade moderada sobre a saúde mental também foi comparado. **Resultados:** O estado emocional dos estudantes antes da intervenção de exercícios foi afetado pela exaustão física. Após a intervenção de exercício, o estado emocional dos estudantes universitários mostrou-se mais resistente à exaustão física. As mudanças dinâmicas do estado dos estudantes antes e depois da intervenção foram estatisticamente significativas ($P < 0,05$). **Conclusão:** Os esportes de intensidade moderada afetam positivamente a recuperação da saúde mental dos estudantes. **Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.**

Descritores: Estilo de Vida Saudável; Exercício Aeróbico; Esportes; Angústia Psicológica.

RESUMEN

Introducción: El entrenamiento físico de intensidad moderada es una forma eficaz de mejorar la aptitud física, además de promover un importante impacto en el restablecimiento de la salud mental humana. **Objetivo:** El objetivo de este estudio es explorar el efecto del entrenamiento físico de intensidad moderada en la salud mental de los estudiantes. **Métodos:** 100 estudiantes se presentaron como voluntarios para la investigación. El deporte de intensidad moderada que practican los alumnos es el bádminton. Cada ejercicio duró 30 minutos. Se utilizó una escala para detectar los cambios emocionales de los estudiantes después del ejercicio. Se formularon programas de ejercicio de diferente intensidad en función de la mejora del estado de ánimo de los alumnos. También se comparó el mecanismo del impacto del ejercicio de intensidad moderada en la salud mental. **Resultados:** El estado emocional de los estudiantes antes de la intervención de ejercicio se vio afectado por el agotamiento físico. Tras la intervención de ejercicio, se demostró que el estado emocional de los estudiantes universitarios era más resistente al agotamiento físico. Los cambios dinámicos en el estado de los alumnos antes y después de la intervención fueron estadísticamente significativos ($P < 0,05$). **Conclusión:** Los deportes de intensidad moderada afectan positivamente a la recuperación de la salud mental de los estudiantes. **Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.**

Descriptor: Estilo de Vida Saludable; Ejercicio Aeróbico; Deportes; Distrés Psicológico.



INTRODUCTION

Contemporary psychologists define emotion as a complex pattern of physical and mental changes. Topics include physiological arousal, sensations, cognitive processes, and behavioral responses. So emotions are the external manifestations of human experience. It is the background of all mental activity. It has a significant impact on human behavior.¹ The emotional state is also a part of the mental state. Emotions play an essential role in college students' physical and psychological health. An excellent emotional condition can inspire the right motivation. It can affect the development of individual learning, memory, social judgment, and creativity. Emotions can include positive and negative emotions. Numerous studies have identified how positive and negative emotions affect health and behavior. Reducing negative emotions has become a common strategy for dealing with health and behavioral issues. Also, strengthening positive emotions has become an essential means of promoting health.

Physiological arousal triggered by the dynamic environment can lead to the highest performance levels. Interventions can optimize the individual's arousal level by triggering individual positive emotions. The experiment can thus yield efficient results.² The use of sports as an intervention in sports psychology to affect emotional states has been confirmed by relevant research. The use of aerobic exercise in physical exercise to intervene in the emotional state of college students has achieved specific results. High-level students have better control over their emotional states than low-level students. So, training has gradually been proven to be an effective means of affecting emotions. However, there is a lack of detailed research on how exercise intervention programs affect mood.

METHOD

Research objects

The research object is 100 sophomore students. There are 50 males and 50 females. Study participants pledged to get at least 30 minutes of physical activity per day for a month.³ Participants were both physically and mentally healthy.

Research methods

Aerobic exercise program

Exercise time: Students do 30 minutes of aerobic exercise each time.

Exercise Intensity: Moderate intensity. We are based on the American College of Sports Medicine's grading scale of aerobic exercise intensity for healthy adults.⁴ At the same time, we established the moderate exercise intensity of college students based on the relevant results of domestic college students as the research objects: the exercise load is set as 60% to 69% of the individual's maximum heart rate. Maximum heart rate = 220 - age.

Sports Intervention Program: Students play fun badminton on the badminton court. The sports project consists of two parts playing high ball and fun competition.

Emotional state task measurement

We used the Exercise-Induced Emotion Scale to measure emotional state. The scale includes four dimensions: vitality, physical and mental calm, physical exhaustion, and active engagement. A higher vitality score indicates better stamina or energy recovery and stimulation.⁵ The higher the mind and body calm score, the more peaceful and relaxed the mind and body are. A higher physical exhaustion score indicates that the individual is more physically exhausted. A higher engagement score suggests that the individual is more engaged in the exercise.

Experimental procedure

The experimental procedure includes a pre-test, exercise intervention, and post-test.

The pre-test was mainly conducted with basal heart rate and measurement questionnaires. Students' basal heart rate should be tested before exercise intervention. This makes it easy to ensure heart rate recovery after exercise intervention.

Exercise intervention includes time control, intensity monitoring, and specific program implementation. After completing the two tasks in the pre-test, the students began to perform exercise intervention. Students play 30 minutes of moderate-intensity badminton. When the blood gas first enters the exercise phase, no recording is recorded until its heart rate reaches a moderate intensity.⁶ The study used the Polar scale to monitor mental strength. Students practice the high ball for the first 15 minutes. The content includes two-player sparring and four-player cross-playing. The last 15 minutes are fun badminton games. One person plays the ball, and the other picks up and delivers the ball according to the rules. The cooperation of the two and the judgment of speed are the key factors.

The post-test is mainly a questionnaire test after the subjects have recovered to their basal heart rate after exercise intervention.

We use formula (1) to construct a comprehensive index of risk factors for students under moderate-intensity exercise: the evaluation matrix of risk

$$p_p = \begin{cases} p_0 \\ p_0[1 - (t - t_0)/t_f] \\ 0 \end{cases} \quad (1)$$

p_0 stands for controllability assessment of student risk factors. t_0 represents the assessment of the probability of occurrence of each student's risk factor. t_f represents an assessment of the severity of the student's risk. We use formula (2) to classify the risk level of students under moderate-intensity exercise

$$g(f_v) = \begin{cases} rand(f_{vmin}, f_{vmax}) \times p_p \\ \frac{1}{\sigma_v \sqrt{2\pi}} e^{-\frac{(f_v - f_{vmin})^2}{2\sigma_v^2}} \end{cases} \quad (2)$$

(f_{vmin}, f_{vmax}) represents the different levels of student risk factors. σ_v represents the detrimental nature of the student's risk factor. e represents the standard deviation of student risk factor assessments. We aggregated different student risk levels for moderate-intensity exercise.⁷ In this way, a student risk assessment model under moderate-intensity training was established.

Statistical analysis

The data were analyzed by SPSS 17.0. We performed an F-test and a paired-samples t-test on the data. Statistical analysis was significant at $p < 0.05$.

RESULTS

Result analysis of the effect of short-term moderate-intensity exercise on various dimensions of emotional state

In the pre-test, the effect of the four-dimension factors was significant. There were differences between the impact of the four dimensions of post-test emotional state (Table 1). Each of the three dimensions of the pre-exercise dynamic state measurement (vigorous stimulation, physical and mental calm, and active engagement) interacted with the other dimension, physical exhaustion. Post-test vigor stimulation interacted with physical fatigue and active engagement, respectively.⁸ Physical and mental calm interacts with physical fatigue and active

engagement, respectively. Physical exhaustion interacts with the other three dimensions. Energetic stimulation, physical and mental calmness and positive attention in the emotional state of college students before exercise intervention were all affected by physical exhaustion. The activation of vitality in the emotional state of college students after exercise intervention was affected by physical exhaustion and positive engagement. Peace of mind is affected by physical exhaustion and positive attention. Active engagement is influenced by energy arousal, physical and mental calm, and physical exhaustion. No matter whether it is before or after exercise intervention, there is only no interaction between vitality stimulation and physical and psychological peace in the emotional state of college students.

Analysis of the results of the emotional state of college students before and after short-term moderate-intensity aerobic exercise

We used paired samples t-test for pre-and post-test statistical analysis. The results found that only the “active engagement” dimension score was significant in the “Exercise-Induced Emotion Scale.” This shows that college students can put more energy into exercise after moderate-intensity exercise. It can mobilize positive emotions. (Table 2)

DISCUSSION

Interaction between emotional states of college students before and after exercise intervention

First of all, before the exercise intervention, college students measured vitality stimulation, physical and mental calmness, and active engagement through the “Exercise-Induced Emotion Scale,” which was all affected by physical exhaustion. Vitality is reflected in the full recovery of energy, stamina, and stimulation. Physiological fatigue is the general feeling of fatigue in the body.⁹ The emotional state produced by the vibrancy of college students before participating in sports is directly related to physical exhaustion. College students have high enthusiasm to participate in sports during sports intervention or exercise. At this time, they must first consider the degree of physical exhaustion of the self. If you are in the menstrual cycle or feel unwell,

Table 1. Comparison of the results of each dimension of different emotional states before and after exercise intervention.

Dimension	Pre-test	Post-test
Vitality stimulates	8.53±2.71	9.57±2.53
Peace of mind	8.93±2.56	9±2.51
Physical exhaustion	3.8±2.85	5.73±2.91
actively involved	9.17±2.91	11.93±2.51

Table 2. T-test results before and after exercise intervention (M±SD).

Dimension	Pre-test	Post-test	T	p
Vitality stimulates	8.43±1.71	9.47±1.43	-1.63	0.11
Peace of mind	8.93±1.46	9±1.39	-0.15	0.88
Physical exhaustion	3.8±1.85	4.73±1.91	-1.54	0.13
Actively involved	9.07±1.91	10.93±1.49	-1.71	0.01

you should reduce the intensity or change the way you exercise. They will choose the exercise that suits them to keep their mood stable and healthy.

The four dimensions of the emotional state of college students after exercise intervention had different interaction effects than those before exercise intervention. After moderate-intensity exercise, it was found that vitality, physical and mental calmness, and active engagement were all affected by physical exhaustion.¹⁰ After training, the physical fatigue of college students is still an essential factor affecting other emotional dimensions. Energetic stimulation, biological and mentally calm, and physical exhaustion interacted positively. The influence between vitality stimulation and active engagement, the impact of physical and mental calmness and active engagement, the effect of physical exhaustion, and active engagement are all essential effects of exercise on the emotional state of college students.

The influence of the emotional state of college students before and after exercise intervention

Only active engagement in the four dimensions showed significant differences after exercise intervention. The scores of active engagements after exercise intervention were higher than those before exercise intervention. This suggests that exercise promotes the activation of positive emotions. The interaction analysis showed that vitality stimulation, physical and mental calmness and physical exhaustion all interacted with active engagement.¹¹ The t-test results showed no significant difference in vitality stimulation, physical and mental calmness, and physical exhaustion before and after exercise intervention. The emotional engagement was triggered after moderate-intensity exercise, but energy arousal was not. The moderate-intensity practice of badminton + fun sports may not have the effect of stimulating vitality. The energy-stimulating impacts of other types of low-intensity or high-intensity exercise may be more pronounced. The relaxed emotional state of physical and mental calm was not significantly changed after moderate-intensity exercise intervention. In this study, subjects maintained a consistent emotional state of physical and psychological calmness before and after the exercise intervention. It has no ups and downs.¹² This suggests that moderate-intensity exercise induces a happy emotional state in the subjects. The state of physical fatigue indicated that the emotional state of active engagement was triggered before the physical fatigue was reached after the exercise intervention. This shows that this moderate-intensity exercise can trigger positive emotions when college students are not physically exhausted.

CONCLUSION

Energetic stimulation, bodily and mentally calm, and physical exhaustion interact positively. After the medium-intensity badminton + fun project intervention, people can have better positive attention to emotional state. Their physical fatigue is not obvious, which proves that the incentive effect of the moderate-intensity physical training has a very obvious positive incentive effect.

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