

# ***Analysis of the Relationship between Physical Exercise and Mental Health***

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**Abstract:** The relationship between physical exercise and mental health has always been the focus of psychological research. The critical role of physical exercise on mental health is being valued by the general public. This paper presents the impact of various forms of physical activity on adolescents' mental health and explores the rationale behind how exercise benefits mental health. Through the review and analysis, it concludes that physical exercise contributes to the development of adolescents' mental health in terms of emotion, cognition and social adaptation, and the physiological mechanism and psychoanalytic theory are one of the reasons why exercise affects mental health. This paper hopes to play a role in promoting future researches of human mental health.

**Keywords:** physical exercise, mental health, teens, review

## **1. Introduction**

"Health" is defined by the World Health Organization as adequate physical, psychological, and social adaptability. It can be seen that in addition to physical health, mental health is also an indispensable and essential component. Exercise is the best prescription for maintaining health, not only for physical but also for mental health. This paper introduces the effect of different physical exercise methods on the mental health of exercisers and discusses the reasons why physical exercise promotes mental health. Today, exercise is advised as an efficient supplemental therapy for a variety of mental health issues. However, researchers have not drawn a clear cause-and-effect relationship between exercise and mental health, because other reasons cannot be ruled out at the moment, this review discusses three areas: emotion, cognition and social adaptability. This paper hopes to play a role in promoting future researches of human mental health.

## **2. Physical Exercise and Mood**

### **2.1. The Effect of Physical Exercise on Mood**

Emotion is the embodiment of attitude towards objective things and is one of the most important indicators to measure the impact of physical exercise on mental health. Aerobic exercise is a way to regulate psychological problems and improve mood. Appropriate aerobic exercise can effectively reduce negative emotions such as depression, anxiety and anger. Moses et al. divided the

participants into high-intensity and moderate-intensity training through random assignment and experimentation. The results found that moderate exercise had significant benefits for improving mental health [1]. Steptoe and Cox divided the students into a high-intensity exercise group and a low-intensity exercise group and concluded that the high-intensity exercise group had increased tension and fatigue after exercise, and the low-intensity exercise group had increased excitement and vitality [2]. The results of these two studies show that moderate aerobic exercise can improve mood. In contrast, high-intensity aerobic exercise does not improve significantly and even increases the production of negative emotions. The use of different forms of aerobic exercise can interfere with and destroy negative psychological orientation and improve well-being. Swimming, as physical activity, not only promotes physical fitness but also helps improve emotional well-being. Baltas randomly divided 60 students into two groups. The experimental group participated in swimming training for eight weeks, 2 hours each time, and the control group did not participate in swimming training. Baltas analyzed them with a stress scale II and found that swimming effectively reduced stress levels [3]. Research by Skead and Rogers shows that more frequent exercise is positively associated with emotional well-being among college students [4]. Quiroga et al. surveyed 475 non-professional dancers. Quantitative and qualitative analysis showed that dancing promotes a pleasurable experience for the mind and body and is a method of coping with stress [5].

## **2.2. Reasons Why Exercise Improves Mood**

According to psychoanalytic theory, an explanation for the beneficial effects of exercise may be transferred, an adaptive defence mechanism. Shifting refers to relieving anxiety by redirecting negative emotions from within to other objects. Exercise provides a cathartic function, releasing emotions such as anger and depression while distracting attention during exercise [6]. Exercise can temporarily keep people away from bad emotions, and the "happy hormone" will fill the brain and make people feel happy. Exercise by itself has been shown to encourage endocrine changes in the human body, according to scientific research. After exercise, the brain releases endorphins, popularly known as the "happy hormone", which have the same effects as morphine in that they reduce pain and increase feelings of bliss [6]. People's bodies and brains are in a relaxed and contented condition as a result of endorphin stimulation when exercise reaches a specific level, increasing endorphin secretion. This sense of pleasure reduces the level of depression, anxiety, and other negative emotions.

## **3. Physical Exercise and Cognition**

### **3.1. The Effect of Physical Exercise on Cognition**

Cognitive ability refers to the various abilities that individuals apply in the cognitive process, such as perception, memory, attention, execution, etc. Physical exercise has a beneficial effect on the cognitive development of adolescents. A meta-analysis by Sibley and Etnier found that for children and adolescents, physical activity is positively associated with cognition and that physical activity indirectly promotes cognitive performance by reducing anxiety and increasing self-esteem [7]. Children who are physically fit have higher levels of neuroelectric reactivity (P3 amplitude in brain evoked potentials), assimilate information more quickly, and perform better on executive control tests [8]. The researchers divided the adolescents into exercise treatment and no treatment groups and experimented with auditory-verbal learning tasks. The results showed that adolescents performed better on learning tasks and recalled content significantly better after a short delay in the exercise condition [9]. Soga et al. used two experiments to investigate the effects of acute moderate-

intensity exercise on executive function in adolescents. The results suggest that moderate-intensity physical activity has a selective promoting effect on the executive function of adolescents [10]. This suggests that physical activity for cognitive development is supported by many studies. Wang and Li conducted an experimental study on the attention of 10 adolescents using sampling, experimental, and statistical methods. It is concluded that moderate physical exercise has a significant effect on the distribution of attention and concentration of adolescents [11]. A study by Shoemaker et al. found that 20 minutes of moderate-intensity swimming can improve cognitive performance in adolescents [12].

### **3.2. Reasons Why Exercise Improves Cognition**

Physical activity improves memory because of the hippocampus. One of the most researched brain structures related to spatial memory is the hippocampus [13]. Exercise can increase the blood supply of the hippocampus and provide energy for the regular operation of the hippocampus so that the hippocampus can remember more content. Physical exercise may induce hippocampus plasticity. Evidence has demonstrated that physical exercise increases hippocampus neurogenesis, cell proliferation and dendritic branching [13]. Exercise can also promote the production of neurotrophins in the hippocampus, which promote the growth of brain cells, thereby making the hippocampus more efficient in memory. The link between exercise and cognition has also been explained in terms of physiological factors. The blood supply to the brain is increased by exercise, giving the brain additional energy to think. Second, the central nervous system's IGF1 (a substance that functions as a neurotrophic factor) keeps brain cells alive. Studies have revealed a significant correlation between increased blood IGF1 levels and enhanced cognitive performance because IGF1 participates in neurogenesis [13]. Exercise promotes the secretion of dopamine and thus improves concentration [14]. One role of dopamine is to help block external and internal noise. When the level of dopamine rises, the ability to block interference will increase, and it is difficult to be affected by external and internal interference, and it is easy to concentrate. Exercise is a healthy and effective way to increase dopamine levels and focus more after exercising.

## **4. Physical Exercise and Social Adaptability**

### **4.1. The Effects of Physical Exercise on Social Adaptability**

The term “social adaptation” refers to the behavioral and psychological adjustments that individuals make in order to better function in society. The social characteristics of sports determine that it plays an essential role in promoting people's social adaptability. In team sports, physical activity promotes interpersonal relationships, eliminates loneliness and fosters a sense of social responsibility. Yao and Tang trained 150 college students in aerobics class on the five significant personalities of experimental studies, and the results show that college students learn through aerobics classes. After training and exercise, there were significant improvements in responsibility, social interaction, and social tolerance compared with those who did not participate in aerobics classes [15]. University of Michigan researchers compared groups of 709 teens based on questionnaire scores and found that teens who scored high on leadership skills spent more time per week in physical activity [16]. Exercise led to modest but statistically significant improvements in physical self-concept and self-esteem, according to four meta-analytical reviews. Gruber compared the effects of several classroom physical education exercises on teens' self-esteem scores and discovered that aerobic fitness had a considerably greater impact [17]. A longitudinal study of personality change by Allen and Laborde found that physical activity contributes to the formation of

famous personalities. The more extroverted and low neurotic exercisers tend to be, the higher the degree of participation in physical activity [18]. Li explored the impact of participating in volleyball clubs on the self-confidence of teenagers through experimental and statistical methods and came to the conclusion that participating in volleyball clubs significantly improved the self-confidence of teenagers [19].

#### 4.2. Reasons Why Exercise Improves Social Adaptability

The basic assumption of social interaction is that social interaction with friends, co-workers, etc., during physical activity is pleasant [20]. Group activities require working with teammates, communicating with coaches, and competing with opponents. Therefore, team sports provide an external environment for communication. This enhances the ability of expression to a certain extent and promotes interpersonal communication. The charm of sports is to make people break through barriers and loneliness, gather on the sports field, and establish an equal, close and harmonious relationships. Teenagers can establish friendships with others on the sports field. Over time, teens will also learn better ways to live harmoniously with others and develop a popular personality.

#### 5. Conclusion

Overall, physical activity plays a vital role in adolescents' mental health. Exercise can improve mood, promote cognition, and improve social resilience. In addition, psychoanalytic theory, social interaction hypothesis, physiological mechanism, etc., can all be used to explain why physical exercise has a role in promoting mental health. A review of the extensive literature found that researchers have not yet to draw a clear cause-and-effect relationship between exercise and mental health because other causes cannot be ruled out. Despite these drawbacks, these research are important because exercise has been proven to be a successful mental health treatment. Future research could focus on school physical education and apply research on the relationship between exercise and mental health to the school's physical education process, by reforming traditional teaching methods, strengthening theoretical teaching, ensuring physical activity time, and improving school sports competitions, promoting the cultivation of teenagers' psychological quality through school sports.

#### Acknowledgements

I acknowledge the helpful suggestions from Prof. A. Ong, Prof. HY. Y and Prof. Wang.

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