

Study on the Intervention Effect of Frisbee Exercise on College Students with Depression

Zhongzhong Hu¹, Keren Zhou^{2,*}

¹ Department of Sports Science, Wenzhou Medical University, Wenzhou, Zhejiang, China

² School of Ophthalmology and Optometry, Wenzhou Medical University, Wenzhou, Zhejiang, China

* Corresponding author: Keren Zhou

Abstract: The study investigates the effects of a 16-week Ultimate Frisbee program on depression, self-esteem, and sleep quality among college students with depression. Utilizing stratified random cluster sampling, 30 students participated in weekly 90-minute sessions, which included skill training, mini-games, and matches. Measurements were taken using the Hamilton Depression Rating Scale (HAMD-17), Self-esteem Scale (SES), and Pittsburgh Sleep Quality Index (PSQI). Post-intervention, participants showed significant improvements: reduced HAMD-17 scores, increased SES scores, and improved PSQI scores. Specifically, the program demonstrated a significant efficacy rate of 66.7% and an overall efficacy rate of 93.3%. Ultimate Frisbee is recommended as a valuable complementary therapy for managing depression in college students, contributing to a holistic approach to mental health care.

Keywords: Frisbee; College Students; Depression.

1. Introduction

Depression is one of the most prevalent mental health disorders globally. According to the World Health Organization, there are approximately 322 million individuals affected by depression, representing 4.4% of the world's population. It is projected that by 2030, depression will become the leading cause of disease burden worldwide [1]. Depression is a common mental health issue characterized by persistent sadness, loss of interest, and a range of physical and cognitive symptoms [2]. The preferred intervention for depression is currently medication, which can relieve symptoms in a relatively short period [3]. However, medication has drawbacks such as dependence, poor compliance, a high relapse rate, and a lack of response in over half of the patients [4]. Lopresti found that individuals who regularly participate in physical exercise have a significantly lower risk of developing depression [5]. Furthermore, the positive effects of exercise on mental health are especially notable in individuals with anxiety and depression. A meta-analysis of 42,264 individuals demonstrated that exercise significantly reduces anxiety levels [6]. Physical exercise has also been used as a treatment method for depression. Studies indicate that individuals who engage in physical exercise 2-3 times per week have a lower risk of depression, anger, and frustration compared to those with little or no physical exercise [7]. Therefore, given the psychological and physiological health benefits of physical exercise, it is increasingly recognized by researchers as an alternative or adjunctive treatment for improving depression. This study explores the effects of a 16-week Frisbee exercise program on depression, self-esteem levels, and sleep quality in college students with depression.

2. Materials and Methods

2.1. Participants

Using the stratified random cluster sampling method, 600 college students from W City were selected for psychological

screening using the Symptom Checklist 90 (SCL-90). The criterion for potential depression was set as a depression factor score greater than 3. After the initial screening, further evaluation was conducted using the Hamilton Depression Rating Scale (HAMD-17). Among those with a HAMD score of 18 or higher, a total of 40 students with potential depressive symptoms were identified. From these identified students, 30 students (18 males and 12 females) volunteered to participate and were included in the study after a brief interview.

2.2. Experimental Design

Frisbee sessions are held for 90 minutes every Tuesday at a standard five-a-side football field for 16 weeks. The program includes one coach, six Frisbee enthusiasts, and thirty patients with depression. The coach is responsible for arranging the course content, which includes sessions on Frisbee rules explanation, Frisbee skills training, Frisbee mini-games, and Frisbee matches. The Frisbee enthusiasts act as assistant coaches, helping patients with depression better learn Frisbee techniques, create an active atmosphere, and assist others in integrating into the group.

2.3. Measures

The Hamilton Depression Rating Scale is highly sensitive in detecting changes in depressive states and is considered one of the most effective tools for use in depression treatment research. The Hamilton Depression Rating Scale (HAMD-17) is used to assess depressive moods [8]. The scale includes 17 items, with each item scored between 0-4 or 0-2. A total score above 24 points may indicate severe depression; a score between 17 and 24 points indicates mild to moderate depression; a score between 7 and 16 points may indicate the presence of depression; and a score below 7 points indicates no depressive symptoms. The reduction rate calculation is performed using the HAMD scores of each patient before and after treatment to evaluate the clinical efficacy for each patient. The reduction rate is calculated as follows: Reduction Rate = [(Pre-treatment Score - Post-treatment Score) / Pre-treatment Score] × 100%. Efficacy is classified into four levels:

HAMD reduction rate $\geq 75\%$ is considered cured; 50%–75% is considered significantly effective; 25%–50% is considered moderately effective; $< 25\%$ is considered ineffective. The significant effect rate is calculated as [(Number of patients with significant effect + Number of patients with marked effect) / Total number of patients] $\times 100\%$, and the effective rate is calculated as [(Number of patients with significant effect + Number of patients with marked effect + Number of patients with moderate effect) / Total number of patients] $\times 100\%$. The scale has demonstrated strong reliability, with a test-retest reliability of 0.96 and an internal consistency reliability of 0.86.

The Self-esteem Scale (SES) is used to assess self-esteem levels [9]. The scale consists of 10 items and uses a 4-point scoring method, ranging from "strongly disagree" to "strongly agree," scored 1 to 4 points, respectively. Six items are positively scored, while four items are reverse scored. The total score ranges from 10 to 40, with higher scores indicating higher levels of self-esteem. The scale has demonstrated strong reliability, with a test-retest reliability of 0.84 and an internal consistency reliability of 0.86.

The Pittsburgh Sleep Quality Index (PSQI) is used to assess sleep quality [10]. The scale consists of 18 items and uses a 4-point scoring method, with responses ranging from "very good" to "very bad," scored 0 to 3 points. The total score is the sum of the scores for each item, ranging from 0 to 21 points. Higher scores indicate poorer sleep quality. The scale's test-retest reliability and Cronbach's alpha coefficient are 0.99 and 0.85, respectively.

2.4. Statistical Analyses

Statistical analyses were conducted using IBM SPSS Statistics software (version 26.0, IBM, Chicago, IL, USA). The results are expressed as the mean $\pm$ standard deviation. A paired t-test was used to compare within-group differences in HAMD-17, SES, and PSQI scores between baseline and after 8 weeks. The threshold for statistical significance was set at $p < 0.05$.

3. Results

According to Table 1, after 16 weeks of frisbee training, there was a significant decrease in HAMD-17 and PSQI scores among college students with depression, and a significant increase in their self-esteem levels. This indicates that frisbee training can significantly reduce depressive symptoms and improve self-esteem and sleep quality in college students with depression.

Table 1. Comparison of HAMD-17, SES, and PSQI Scores in College Students with Depression Before and After Intervention

Item	Pre-test	Post-test	t value	p value
HAMD-17	27.15 $\pm$ 5.37	11.38 $\pm$ 2.69	5.62	<0.01
SES	21.68 $\pm$ 4.65	29.73 $\pm$ 4.39	-12.36	<0.01
PSQI	16.54 $\pm$ 4.23	8.92 $\pm$ 4.27	6.21	<0.01

HAMD-17=Hamilton Depression Scale-17; SES=Self-esteem Scale; PSQI=Pittsburgh Sleep Quality Index

According to Table 2, after 16 weeks of Ultimate Frisbee training, the significant efficacy rate for college students with depression is 66.7%, with an overall efficacy rate of 93.3%. This suggests that Ultimate Frisbee demonstrates a favorable clinical effect in treating depression among college students.

Table 2. The clinical treatment efficacy of college students with depression after 16 weeks of frisbee training.

Clinical efficacy	cured	significantly effective	moderately effective	ineffective
Number of people	2	18	8	2

4. Discussion

College students are in a transitional phase from adolescence to adulthood. During this period, their psychological state is relatively fragile and sensitive. When they encounter stressful life events, they are prone to experiencing negative emotions and depression. With the rapid transition of individual psychology toward maturity, yet not fully matured, some college students often exhibit maladjustment and even psychological disorders due to changes in living environment, learning characteristics, interpersonal relationships, and other factors. Fitness activities can offer students opportunities to relax their bodies and minds and promote mutual communication, serving as an important means to regulate their mental and physical states. This provides theoretical support for using Ultimate Frisbee to address depression among college students.

The pathogenesis of depression remains unclear. The "endorphin hypothesis" suggests that exercise activates the endogenous opioid system, prompting the brain to secrete β -endorphin (β -EP), which reduces pain and produces an overall sense of well-being [15]. This, in turn, can lower levels of anxiety and depression. The catecholamine hypothesis posits that certain types of depression are associated with deficiencies in catecholamines, particularly norepinephrine [16]. Exercise can increase norepinephrine levels, a chemical that regulates the brain's stress response, thereby reducing physical and mental stress and enhancing the body's ability to cope with psychological tension. Finally, the neurotrophic hypothesis suggests that low levels of brain-derived neurotrophic factor (BDNF) are positively correlated with the risk of developing depression [17]. Exercise increases BDNF levels in the body. BDNF plays a crucial role in maintaining the normal physiological functions of neurons and can help improve decision-making, cognitive abilities, and learning capacities.

Some studies have shown that the occurrence of depression is closely related to an individual's level of self-esteem. People with low self-esteem are more likely to experience loneliness, sadness, despair, and other negative emotions, and they have a significantly higher risk of developing depression [11]. Research indicates that low self-esteem plays a crucial role in the occurrence and development of depression and is one of its possible symptoms. Depressed patients can enhance their self-esteem and self-worth by mastering Frisbee skills or winning Frisbee competitions. These positive experiences can counteract negative self-perceptions and promote a more positive self-image. The diversity, complexity, variability, and enjoyment of disc sports enable patients to experience a broad range of emotional states, including happiness, satisfaction, tension, excitement, and anxiety, through interactions with others. Additionally, the group nature and mutual support inherent in collective activities can inspire patients' social awareness, enhancing their self-esteem, self-confidence, and sense of responsibility. When patients participate in group activities, they often exhibit a strong psychological inclination toward "belonging to a group." Through shared

exercise and mutual respect and consideration, their sense of group interaction further strengthens. They also develop a positive identification with the collective and activities they belong to, as well as psychological compatibility with peers, leading to improved mental health. Moreover, various difficulties and obstacles in collective competitive activities, whether internal (such as emotions of tension, fear, and disappointment) or external (such as environmental, equipment, and capability limitations), necessitate the exertion of willpower to overcome challenges to achieve goals. This process allows patients to better experience a sense of self-worth and success.

The clinical manifestations of depression primarily include loss of interest, low mood, and slow thinking, with patients often experiencing sleep disorders. The recurrence and worsening of sleep disorders can exacerbate depression, creating a vicious cycle that affects the patient's physical and mental health. Persistent sleep disorders are also an independent risk factor for suicide in patients with depression [12]. Frisbee sports offer a way to release tension and divert attention. The fun and excitement of the game can distract from the pressures of daily life. Frisbee is a high-intensity aerobic exercise that can significantly increase physical exertion, leading to fatigue and, consequently, improved sleep quality. Exercise promotes the release of endorphins, which helps alleviate stress and anxiety—both crucial factors affecting sleep quality. Through frisbee exercise, one can enhance mood, reduce mental stress, and thus achieve better sleep. Additionally, regularly participating in frisbee can help establish a consistent routine, increase daytime activity levels, and reduce nighttime wakefulness, thereby improving sleep patterns and overall sleep quality.

Physical activity is known to release endorphins, which are natural mood-boosting chemicals. As an aerobic exercise, Frisbee stimulates the release of these chemicals, helping to relieve symptoms of depression. Regular participation in this sport can improve mood and reduce feelings of sadness and hopelessness [13]. Frisbee also improves cardiovascular health and increases muscle strength, which can enhance energy levels and reduce fatigue in people with depression. Additionally, Frisbee is a team sport that requires communication and teamwork. These social interactions can help people with depression overcome feelings of loneliness and isolation [14]. Setting and achieving goals in Frisbee can also provide individuals with a sense of purpose and direction.

5. Conclusion

Frisbee exercise can improve depressive symptoms, self-esteem, and sleep quality among college students with depression. While it is not a substitute for professional treatment, Frisbee exercise can serve as a valuable complementary therapy. Integrating this exercise into treatment practices may provide a holistic approach to managing depression and improve patients' quality of life.

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