

Tai Chi Stake Exercise Intervention Improves the Quality of Life, Anxiety, and Depression of Adolescent Patients

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Abstract:

This study aims to analyze the influence of a Tai Chi Stake exercise intervention on the quality of life, anxiety and depressive symptoms of adolescent diagnosed with depression. A total of 138 adolescent with depression were selected as the research subjects. This group was then randomly divided into a control group (n=69) and an exercise intervention group (n=69). The control group only received counseling and drug treatment whereas the exercise intervention group received additional Tai Chi Stake exercise instruction. This experiment had a total of 4 cycles with a duration of 16 weeks (each cycle was 4 weeks long), various scales were used for assessment. The Subjective Quality of Life Scale (SQOL) and the Pittsburgh Sleep Quality Index (PSQI) were used to assess the quality of life and sleep quality of the subjects. The Chinese version of the Reflective Function Questionnaire for Youth (RFQ-Y) was used to assess the self-reflective ability of the subjects. The Hamilton Depression Rating Scale (HAM-D) and Hamilton Anxiety Rating Scale (HAM-A) were used to assess the depressive symptoms and anxiety levels of the subjects. The Personal and Social Performance Scale (PSP) was used to evaluate the social function and the Youth Self-Report (YSR) was used to assess symptoms of anxiety and stress. Finally, the overall assessment was divided into a primary assessment and a secondary assessment using the Hamilton Depression Rating Scale (HAM-D) and the Clinical Global Impression Scale (CGI) scores. There was no significant difference in SQOL, PSQI, RFQ-Y, HAM-D, HAM-A, PSP, YSR, CGI scores between the two groups before the intervention ($P > 0.05$). However, after the intervention of the Tai Chi Stake exercise, the SQOL, RFQ-Y, and PSP scores of the intervention group were significantly higher than those of the control group ($P = 0.001$) while the PSQI, HAM-D, HAM-A, YSR, and CGI scores were significantly lower than those of the control group ($P < 0.05$). In addition, the SQOL, RFQ-Y, and PSP scores of the intervention group were higher than those of the control group and the PSQI, HAM-D, HAM-A, YSR, and CGI scores were lower than those of the control group ($P < 0.05$). The efficiency of the Tai Chi Stake exercise intervention group was significantly higher than that of the control group ($P < 0.05$) demonstrating that a Tai Chi Stake exercise intervention can significantly improve the symptoms of depression, reduce anxiety, improve the quality of life, and reduce the psychological stress and related symptoms of adolescent diagnosed with depression.

Keywords: *Tai Chi Stake, College students, Depression, Exercise intervention.*

I. INTRODUCTION

Depression is a common health problem for adolescent today which mainly manifests as depression, anxiety, insomnia, cognitive impairment, and even suicidal tendencies [1]. According to a recent epidemiological survey, depression is widespread among adolescent and some adolescent even display depressive symptoms that meet the clinical diagnostic criteria however, this serious condition still has not attracted the attention of families [2]. Previous research data shows that the incidence of depression among adolescents in P.R. China is increasing year by year and the detection rate of depressive symptoms among adolescent is as high as 30% [3]. Undergraduate students' depression not only affects normal interpersonal communication, daily life, and study, but also greatly increases the risk of suicide. If effective intervention measures are not taken, college students' depression will continue, further increasing the incidence of personality disorders and other phenomena, and seriously threatening their lives [4]. At present, drugs such as Sertraline and Escitalopram are commonly used to treat depression in adolescents. However, drug treatment has certain side effects and cannot completely improve the symptoms of depression. The cure rate of simple drug treatment is relatively low, 36.80% respectively [5]. Exercise therapy is a treatment method that regulates physical and mental balance and restores health through systematic physical activity [6]. In exercise psychology, a large number of studies have shown that physical exercise has an anti-depressant effect [7].

Tai Chi Stake or Pole standing (*zhàn zhuāng*) is a traditional Chinese fitness method of static standing and dynamic squatting exercises that is based on a holistic view of human life and when combined with the knowledge of traditional Chinese medicine, it promotes the mental health of adolescent [8]. Tai Chi stake exercise intervention methods have been used with promising results with female adolescent with depression and with elderly depression patients [9,10]. In addition, Tai Chi stake exercise intervention has also been applied to adolescent depression but its efficacy has not been fully explored. On this basis, this study further confirms that Tai Chi Stake exercise is beneficial to the rehabilitation of adolescent with depression and provides support for a broad application of a Tai Chi Stake exercise intervention.

II. MATERIALS AND METHODS

2.1 Research Cohort:

From January 2020 to January 2021, a total of 126 adolescent depression patients from the First Affiliated Hospital of Zhejiang University of Traditional Chinese Medicine were recruited as the research cohort and randomly divided into control group (n=63) or Tai Chi Stake exercise intervention group (n=63). In the control group, there were 32 males and 31 females, aged between 18.5 and 23.0 years old, with an average age of (19.3±1.8) years old. The course of depression ranged from 3.0 to 11.5 months and the average course of depression was (7.3 ±4.3) months. In the Tai Chi Stake exercise intervention group,

there were 32 males and 21 females, aged between 18.0 and 23.0 years old, with an average age of (18.5 ±2.5) years old. The course of depression ranged from 3.0 to 12.0 months with an average course of (7.5 ±4.5) months. There was no significant difference in basic clinical data between the two groups ($P < 0.05$); they were comparable. All patients and their families were informed of the study and signed an informed consent form. This study was approved by the Ethics Committee of the First Affiliated Hospital of Zhejiang University of Traditional Chinese Medicine.

Inclusion criteria: (1) The research subjects were volunteers that met the diagnostic criteria for depression in adolescent according to: the Diagnostic and Statistical Manual of Mental Disorders Fourth Edition (DSM-IV), the Hamilton Depression Scale 24 (HAMD-24) score ≥ 35 , and the Mood Disorder Questionnaire (MDQ) with a self-assessment scale score ≤ 15 (minimum test volume); (2) The subjects did not take any medication nor did they have any cognitive behavioral therapy. Before treatment, some patients may have had bipolar disorder such as anxiety and mania; (3) Subjects were between 18-23 years old, receiving formal university education and did not have dyslexia.

Exclusion criteria: patients with previous severe physical diseases, patients with a history of neurological diseases, patients with personality or intellectual disabilities, patients with low compliance, patients with drug abuse, patients with movement disorders, patients with other forms of brain damage, patients who were contraindicated with Sertraline, and patients with a history of drug allergies.

2.2 Methods:

The patients in the two groups were treated using conventional group psychotherapy. The control group was treated with Sertraline 50 mg/day (Pfizer Pharmaceutical Co., Ltd., China) and Fluoxetine 20 mg/day (Jiangsu Suzhong Pharmaceutical Group Co., Ltd., China) for 6 weeks as a course of treatment and conduct continuous treatment for 3 courses (Tai Chi Stake Protocol, Opening and closing Stake and Lifting Stake). The Tai Chi stake exercise intervention group followed the same treatment protocol as the control group but additionally followed the Tai Chi Stake exercise intervention after one week of Definitely diagnosed depressive disorder. Starting one week after these patients received treatment, the International Physical Activity Questionnaire (IPAQ) was given to calculate the average daily activity of the patients and to evaluate their exercise ability. The results of the IPAQ were then interpreted through the Exercise Prescription Section of the Exercise Measurement Guidelines (American College of Sports Medicine, ACSM's Guidelines for Exercise Testing and Prescription, 9th edition). Both static and dynamic exercises were prescribed.

2.2.1 Tai Chi Stake exercise intervention protocol:

(1) Tai Chi Stake Protocol: Refer to the "Tai Chi Stake" design intervention method in the "Chinese Wushu Course" approved by the National College of Physical Education Textbook Committee [11]: ① Wuji Stake (general body posture): Stand naturally with your feet shoulder-width apart, knees pointing forward and slightly bent, and arms extended and rounded in front of your chest with fingertips pointing to

each other as if a large balloon is pressing the arms, hands, and fingers outward. ② Opening and closing Stake(standing exercise): Starting from the Wuji Stake, the two finger tips are facing each other, the hands are pressed outwards, the arms are rounded in a large arc, and the legs are slowly bent halfway at the same time Squat, breathe evenly in depth and length; ③ Lifting Stake(squatting exercise): Stand on the Wuji Stake with palms and knees facing each other. When "down", the legs are slowly bent and half squat, exhale, and when "rise", the legs are naturally straightened and inhale.

(2) Intensive training: Chinese martial arts experts (who have a long experience with Tai Chi Stake exercise) intensively taught the subjects of the intervention group the main points and precautions of the Tai Chi Stake exercise; body adjustment, breath adjustment (Pranayama), and heart rate adjustment.

(3) Continued guidance: These same experts provided ongoing instruction to assist the subjects to gradually and continually improve in these three areas. The study participants also listened to relaxing music during this part of the intervention.

(4) Moderate exercise intensity: All subjects achieved a target heart rate that was 64-75% of their maximum heart rate where maximum heart rate was calculated as 207 minus 70% of their age. At this heart rate, the subjects felt slightly sweaty.

(5) Exercise frequency: Participants needed to recover their physical strength and relieve exercise fatigue from the Tai Chi Stake exercises. Therefore, in this study, the exercise frequency was set to 3-5 times a week with at least one day between two exercise sessions to improve the exercise effect.

(6) Exercise duration: Excessive exercise will not only cause excessive fatigue of the participants but also affect their confidence. Therefore, in this study, the duration of each exercise session was set to 0.5-1 hour. On the premise that the exercise session is maintained at 0.5-1 hour, combined with the tendency of depression patients to be unwilling to exercise and to be easily fatigued, they were allowed to rest briefly every 10 minutes during the session.

(7) Exercise implementation: According to the intensity, frequency and duration of the above Tai Chi Stake exercise, a unified Tai Chi Stake exercise intervention plan was formulated. Participants practiced indoors or outdoors on playgrounds. If the participant was unwilling to practice during the designated time, nurses provided psychological counseling and encouragement to the participant to complete the exercise after getting a proper rest. The course of Tai Chi Stake exercise lasted four weeks, with the consecutive courses of intervention for a total duration of twelve weeks. During the intervention of the Tai Chi Stake exercise, two subjects withdrew from the study because of repeated refusal to cooperate and one subject could not be followed due to unknown reasons. The remaining 60 subjects completed the entire study and participated in the monitoring of the required indicators.

2.2.2 Primary outcome measures:

(1) Anxiety assessment: The Hamilton Anxiety Rating Scale (HAM-A) was used to assess the anxiety of patients [12]. The evaluation criteria are: severe anxiety disorder > 29 points, moderate anxiety disorder 22-29 points, possible anxiety disorder 7-21 points, and no anxiety disorder less than 7 points.

(2) Evaluation of anxiety and stress symptoms: Youth Self-Report (YSR) [13] is used to evaluate anxiety and stress symptoms. The assessment includes two parts: a problem scale and an ability scale. These scales include: discomfort, social problems, anxiety and depression, cognitive problems, withdrawal, attention problems, aggressive behavior, disciplinary behavior, and self-identity disorder (males only). A three-level scoring method was used for evaluation. A score of 0 indicates that this phenomenon does not occur, a score of 1 indicates that this phenomenon occurs sometimes, and a score of 2 indicates that the frequency of occurrence of this phenomenon is high or the phenomenon is not obvious. The highest score is 202 points which represents the most severe anxiety, stress, and tension symptoms.

(3) Efficacy evaluation: (a) Evaluation of the efficacy is divided into primary efficacy evaluation and secondary efficacy evaluation using the Hamilton Anxiety Rating Scale for Depression (HAM-D) score and the Clinical Global Impressions Scale (CGI) score respectively [14]. The HAM-D assessment includes 24 items such as depression, sleep disorder, guilt, language, slow thinking, and despair. The higher the score, the more severe the depression. CGI's assessment content includes three dimensions: Severity of Illness (SI), Global Improvement (GI) and Efficacy Index (EI). The SI scale uses an 8-level scoring method; the higher the score, the more serious the depression. The GI scale also uses an 8-level scoring method; the higher the score, the worse the efficacy. (Follow the same pattern) The EI scale uses an x-level scoring method; the higher the score, the better the efficacy. The CGI total score was used to evaluate clinical efficacy. (b) Evaluation of the intervention effect of the Tai Chi Stake exercise: The Hamilton Depression Rating Scale (HAM-D) was used to evaluate the intervention effect. The HAM-D scores before and after the intervention were used to calculate the score reduction rate, where the score reduction rate % = (pre-intervention score - post-intervention score)/pre-intervention * 100. The evaluation of the intervention effect of the Tai Chi Stake exercise was then divided into the following four categories: Recovery, Significant, Effective and Ineffective. Recovery: HAM-D score reduction rate is greater than 75%, Significant: HAM-D score reduction rate is 50-74%, Effective: HAM-D score reduction rate is 25-49%, Ineffective: HAM-D score reduction rate is less than 25%. The total effective rate = (cure rate + apparent rate + effective rate).

2.2.3 Secondary observation indicators:

(1) Quality of life evaluation: The Subjective Quality of Life Scale (SQOL) [15] was used to evaluate the quality of life of patients. The evaluation content includes three contents of general, composition, and dimensions, two dimensions of cognition and emotion, and eight dimensions of peer interaction, family life, self-cognition, anxiety experience, depression experience, living environment, school life, and physical emotions, for a total of 52 items. Each item was scored 1-4 points, the higher the score, the better the

quality of life.

(2) Sleep quality evaluation: The Pittsburgh Sleep Quality Index (PSQI) was used to evaluate sleep quality. This measure includes sleep latency, sleep time, sleep efficiency, and hypnotics use [16]. The total score is 21 points. The higher the score, the worse the quality of sleep.

(3) Mental ability assessment: The Reflective Function Questionnaire for Youth (RFQ-Y) [17] was used to evaluate the mental ability of patients. The assessment includes 46 questions that are divided into an A scale and a B scale. These scales use a centralized scoring with the highest score in the middle option. The B scale uses forward and reverse scoring methods and a 6-level scoring method. The maximum score is 12 points. The higher the score, the stronger the mental ability and the higher the mental level.

(4) Social function evaluation: The Personal and Social Performance Scale (PSP) was used to evaluate the social function of patients [18]. This assessment includes four aspects, namely, activities that are beneficial to society, personal/social relations, self-care, and interference/aggression. The maximum score is 100 points. A score of 71-100 is considered good social function and less obstruction. A score of 31-70 is considered poor social function and the degree of obstruction is average. A score of 0-30 is considered extremely poor social function and requires monitoring and support. The higher the score, the better the social function of the subjects.

2.3 Statistical Analysis

SPSS 20.0 statistical software was used for analysis. The effect size is expressed by the mean \pm standard deviation ($\bar{x} \pm SD$). The independent sample t test and the paired t test were used for the comparison between groups and for the before and after comparison within the group. The data are expressed by frequency and percentage and the comparison between groups uses the χ^2 test. When $P < 0.05$, the difference is statistically significant.

III. RESULTS

3.1 Comparison of the Quality of Life and Sleep between the Two Groups

As shown in TABLE I, there was no significant difference in ISLQ and PSQI scores between the two groups before intervention ($P > 0.05$). After the intervention, the ISLQ scores of the two groups increased and the PSQI scores decreased. At the same time, the ISLQ score of the Tai Chi Stake exercise intervention group was significantly higher than that of the control group and the PSQI score was significantly lower than that of the control group ($P < 0.05$).

TABLE I. Comparison of the quality of life and sleep in the two groups ($\bar{X} \pm SD$, score)

GROUP	CONTROL GROUP(N=63)	SPORTS INTERVENTION GROUP(N=63)	T	P
QUALITY OF LIFE (ISLQ)				
BEFORE INTERVENTION	51.35±16	51.63±5.21	0.314	0.754
AFTER INTERVENTION	63.24±6.33	70.54±7.59	8.578	0.001
T	8.942	15.690		
P	0.001	0.001		
QUALITY OF SLEEP (PSQI)				
BEFORE INTERVENTION	15.61±2.06	15.55±2.09	0.223	0.822
AFTER INTERVENTION	8.95±1.00	5.25±0.65	25.500	0.001
T	24.150	38.240		
P	0.001	0.001		

Note: SQOL refers to the Subjective Quality of Life Scale; PSQI; refers to the Pittsburgh Sleep Quality Index.

3.2 Comparison of the Mental Abilities and Anxiety Levels of the Two Groups

As shown in TABLE II, there was no significant difference in RFQY and HAMA scores between the two groups before the intervention ($P > 0.05$). After the intervention, the RFQY scores of the two groups increased significantly, and the HAMA scores decreased significantly. At the same time, the RFQ-Y score of the Tai Chi Stake exercise intervention group was significantly higher than that of the control group and the HAM-A score was significantly lower than that of the control group ($P < 0.05$).

TABLE II. Comparison of psychological abilities and anxiety scores of the two groups ($\bar{x} \pm SD$)

GROUP	CONTROL GROUP(N=63)	SPORTS INTERVENTION GROUP(N=63)	T	P
QUALITY OF LIFE (RFQ-Y)				
BEFORE INTERVENTION	5.65±0.52	5.55±0.46	0.314	0.754
AFTER INTERVENTION	7.64±0.68	11.20±1.06	8.578	0.001
T	19.500	39.510		
P	0.001	0.001		
QUALITY OF SLEEP (HAM-A)				
BEFORE INTERVENTION	13.23±1.03	13.27±1.10	0.218	0.828
AFTER INTERVENTION	7.98±0.86	5.00±0.55	24.190	0.001
T	32.710	54.880		
P	0.001	0.001		

Note: RFQ-Y refers to the Relative Functioning Questionnaire for Adolescents; HAM-A refers to the Hamilton Anxiety Rating Scale.

3.3 Comparison of Social Function, Anxiety, Stress and Stress Symptoms of the Two Groups

As shown in TABLE III, there was no significant difference in PSP and YSR scores between the two groups before the intervention ($P > 0.05$). After the intervention, the PSP scores of the two groups were significantly increased, and the YSR scores were significantly decreased. In addition, the PSP score of the exercise intervention group was significantly higher than that of the control group, and the YSR score was significantly lower than that of the control group ($P < 0.05$).

TABLE III. Comparison of scores of social function, anxiety, stress, and stress symptoms between the two groups ($\bar{x} \pm SD$)

GROUP	CONTROL GROUP(N=63)	SPORTS INTERVENTION GROUP(N=63)	T	P
SOCIAL FUNCTION (PSP)				
BEFORE INTERVENTION	65.48±7.59	65.52±7.72	0.030	0.976
AFTER INTERVENTION	75.59±7.22	87.16±9.00	8.499	0.001
T	8.017	14.960		
P	0.001	0.001		
ANXIETY, STRESS, EMERGENCY SYMPTOMS (YSR)				
BEFORE INTERVENTION	133.05±1.03	133.11±12.24	0.027	0.978
AFTER INTERVENTION	49.78±0.85	21.24±2.13	41.590	0.001
T	48.080	72.560		
P	0.001	0.001		

Note: PSP refers to the Personal and Social Performance Scale; YSR refers to the Youth Self-Report

3.4 Comparison of HAM-D Scores and CGI Scores at the First Visit of the Two Groups

As shown in TABLE IV, there was no significant difference in HAM-D and CGI scores between the two groups before the intervention ($P > 0.05$). After the intervention, the HAM-D and CGI scores of the two groups decreased significantly. The HAM-D and CGI scores of the Tai Chi Stake exercise intervention group were significantly lower than those of the control group ($P < 0.05$).

TABLE IV. Comparison of HAM-D scores and CGI scores at the first visit of the two groups ($\bar{x} \pm SD$)

GROUP	CONTROL GROUP(N=63)	SPORTS INTERVENTION GROUP(N=63)	T	P
HAM-D				
BEFORE INTERVENTION	32.16±3.46	32.26±3.49	0.167	0.868
AFTER	78.99±2.00	5.15±0.59	14.980	0.001

INTERVENTION				
T	48.160	62.223		
P	0.001	0.001		
CGI				
BEFORE INTERVENTION	9.48±1.12	9.68±1.32	0.951	0.343
AFTER INTERVENTION	3.87±0.89	1.01±0.19	25.550	0.001
T	32.050	52.268		
P	0.001	0.001		

Note: HAM-D stands for the Hamilton Depression Rating Scale; CGI stands for the Clinical Global Impression Scale.

3.5 Comparison of the Overall Effect Evaluation of the Two Groups

As shown in TABLE V and Fig. 1, all efficiencies of the Tai Chi Stake exercise intervention group were higher than those of the control group, and the difference was statistically significant ($P < 0.05$).

TABLE V. Evaluates the overall effect of the two groups

GROUP	RECOVERY	REMARKABLE EFFECT	EFFECTIVE	INVALID	TOTAL EFFECTIVE RATE
CONTROL GROUP(N=63)	22(34.92)	20(31.75)	8(12.70)	13(20.63)	50(79.37)
INTERVENTION GROUP (N=63)	28(44.44)	22(34.92)	11(17.46)	2(3.17)	61(96.82)
X^2	11.507				5.006
P	0.009				0.025

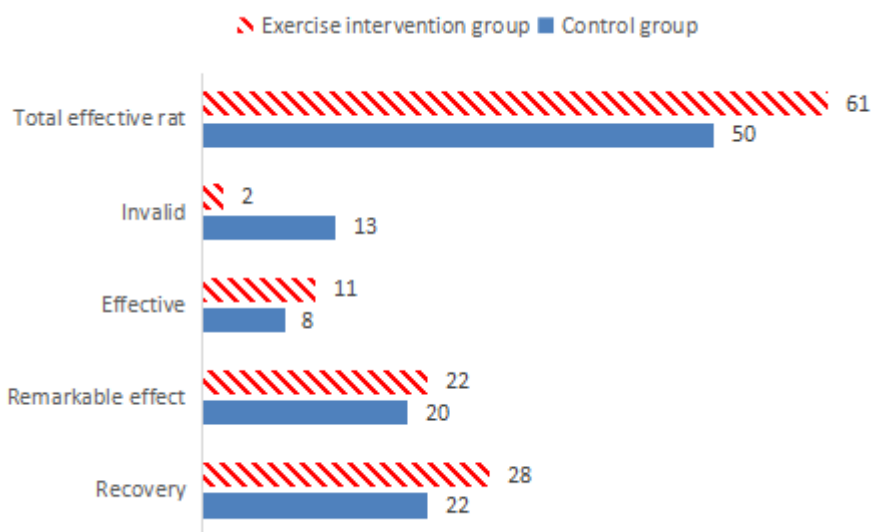


Fig. 1 comparison of the overall effect of the two groups of subjects

IV. DISCUSSION

As a special group of young people, adolescent is in a critical period of development in their psychology and physiology. Their physiological structure changes with age, but their psychological development is still immature. Whether self-planning can be achieved smoothly and whether interpersonal relationships are handled properly, these and other factors will lead to emotional fluctuations of college students. Therefore, a lag in psychological development can easily lead to self-isolation. In the process of study and life, if there is not a correct attitude to deal with stressful events, it is easy to produce unhealthy emotions such as anxiety and depression [19]. Depression is one of the most common psychological diseases of adolescent and is accompanied by inhibited cognitive development and persistent emotional depression. At present, the pathogenesis of depression in adolescent is still unclear. Depression brings high disability and mortality which seriously affects the quality of life and social adaptability of college students. In addition, it also brings varying degrees of burden to schools and families [20].

In the past, hospitals used drugs to treat depression patients. Although drugs can significantly improve the symptoms of depression in adolescents, the overall effect is still poor. Some patients have a high recurrence rate. Studies have shown that depression is related to the cognitive function of hippocampal nerve regeneration [14]. Although the application of Tai Chi Stake exercise as an intervention therapy in patients with depression has been studied, the mechanism of its application has not been analyzed in depth. The results of this present study show that the overall effect of a Tai Chi Stake exercise intervention on adolescent with depression is relatively positive. This may be related to the improvement of the regulation of hippocampal cognitive function, the remodeling of prominent plasticity, and the regeneration of nerves. Studies have shown that Tai Chi's effect on mental health is manifested in cognitive function and emotion. The Tai Chi Stake exercise can improve synaptic plasticity by regulating the cognitive function of the hippocampus, promote nerve regeneration, and cause biological changes in nerves and improve the practitioner's mood [21]. Studies by Li [2] and others have found that short-term Tai Chi Stake exercises can shorten the time of inhibition of functional response under negative emotional stimuli, which may be closely related to the types of Tai Chi Stake's movement characteristics and practice rules. Tai Chi Stake has the movement characteristics of "mind calm and body relaxed", requiring practitioners to focus their minds on the internal and external environment of the body and consciously transform and regulate the excited areas of the central nervous system through the brain to achieve a balanced state of "oneness between nature and man". This not only improves autonomic nerve function, but also reduces sympathetic nerve excitability under this relaxation and calm adjustment so that the cerebral cortex cells can rest thereby improving the brain's ability to tolerate psychological stress and help eliminate mental stress [22]. In addition, whether the practitioner is a beginner or has been practicing for many years, the practitioner's experience of the intensity of Tai Chi Stake exercises is very similar ranging between a low to medium intensity exercise [23]. This kind of aerobic exercise has a positive regulating effect on depression. It can effectively improve depression.

Adolescent with depression often have varying degrees of sleep disturbance which seriously affects their quality of life. Tai Chi Stake exercise intervention can improve breathing and internal circulation

thereby increasing the respiratory pulse rate. At the same time, the half-squatting movement in Tai Chi Stake exercise causes muscle cells to produce lactic acid and causes fatigue which can help depressed patients fall asleep [24]. The results of this study show that Tai Chi Stake exercise intervention can effectively improve the sleep quality and quality of life of depressed people and the fatigue caused by Tai Chi Stake exercise accelerates the sleep of adolescent with depression. At the same time, studies have shown that Tai Chi Stake exercise can accelerate the body metabolism and body hormone secretion of depression patients, relieve anxiety and tension, reduce their focus on their own bad mood and their own diseases, and stimulate and release stress [25]. In other words, practitioners can feel pleasure from Tai Chi Stake exercises thereby improving anxiety and depression symptoms. It can be seen that a Tai Chi Stake exercise intervention can improve anxiety to a certain extent which may be related to the acceleration of metabolism and hormone secretion in the practitioners after exercise.

Intellectualization refers to the ability to understand the mental state of oneself and others. This is also the psychological process of depressed people who feel the changes in themselves and others [26]. In addition, the interactive function is the core ability of intelligence and is the basis for establishing good interpersonal relationships [27]. Social function refers to the functions and abilities required by the various components of the entire social system. Due to self-enclosure, patients with depression have less contact with the outside world resulting in a significant decline in social function [28]. Tai Chi Stake exercise intervention can improve the social function of patients with depression, reduce depression [29], improve their social function and quality of life, and is of great significance to promote the rehabilitation of patients. The results of this study show that Tai Chi Stake exercise can improve the mental state and social function of with depression. We believe that Tai Chi Stake exercise can enhance college students' self-awareness, improve depressive symptoms, and improve social harmony, which is consistent with the above-mentioned research results.

V. CONCLUSIONS

The study concluded that Tai Chi Stake exercise intervention can significantly improve the depressive symptoms and anxiety of adolescent with depression, improve their quality of life, and reduce psychological pressure and stress symptoms.

Although this study found that Tai Chi Stake exercises can improve the psychological emotions of adolescent who are depressed, the sample in this study is small and the duration of Tai Chi Stake exercises is relatively short, therefore, the effects of Tai Chi Stake exercises were not fully utilized. Therefore, the results of this study need to be further confirmed by follow-up studies to improve the quality of life of adolescent with depression.

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