ISSN: 2688-8653

Study on the Effect of 24-style Taijiquan on Maintaining Executive Function in the Elderly

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Abstract

Executive function refers to the higher and more complex processes of cognitive control that are appropriate, purposeful, and goal-directed behavior. The study aims to examine the effects of 12-week 24-form tai chi exercise on the executive function and related core sub-functions of the elderly (how the 12-week 24-form taichi will affect the executive and related core sub-functions of the elderly), and the maintenance of this effect after one month of voluntary exercise (whether these effects will last after one-month voluntary exercise). In this study, 34 elderly people aged 60-74 years were randomly divided into experimental group and control group to undergo MMSE test, MOCA test, Stroop test, 1-back test and More-odd shifting test respectively. The intervention of 24 Tai Chi in experimental group lasted for 12 weeks, 5 times a week, 1 hour each time.The control group lived normally.The experimental group was followed by one month of voluntary exercise after 12-week intervention. After exercise, the subjects were subjected to the Stroop Test, the 1-back Test, the More-Odd Shifting Test to collect data. Then the study will analyze the data statistically by means of mathematical statistics.The findings showed that: (1) to practice 12-week 24-style taijiquan makes the elderly inhibitory ability, ability to refresh and transformation task test accuracy more accurate, suggests that the brain in a period of time to deal with problems of high efficiency, flexibility has been improved to a certain brain, in a month after the improve advantages existing in the detection(which suggests that the brain's efficiency to deal with problems has improved and flexibility has also enhanced as well and that the improved advantages still exist in the test a month later).It is proved that the effect of 24 tai chi exercise in 12 weeks_12-week 24-form exercise can be effectively maintained.(2) Twelve weeks of 24-form Taijiquan exercise has a positive effect on improving the response speed of inhibitory function and refresh function task, but no positive effect on the response speed of switching function task. One month later, the response time decreased obviously in the suppression and refresh tasks, but not in the switching tasks.(3) The practice of 24-form Taijiquan has an obvious effect on improving the overall executive function and the performance of core sub-functions of for the elderly. This improvement effect is not temporary , but persistent. The longer the practice time is, the better the effect of preventing the decline of executive function of the elderly will be.

Keywords

24-type Taijiquan; Executive Function; The Elderly; Maintain.

1. Introduction

Nowadays, many rural areas in Our country have not yet fully been covered with the physical examination. Even if there is a physical examination project, most people are reluctant to go, thinking that to check is a little bit of a disease to check means to have a disease,while not going to the examination means that there is no problem with the body.Therefore, the early treatment

ISSN: 2688-8653

of the disease is not guaranteed, and the best stage of early intervention has been missed at the time of onset.With the advent of an aging society, the health status of the elderly has become the primary issue.In the aging process, the change in cognitive function is the most obvious, of which the change in executive function has the greatest impact.Decline in executive function may not manifest itself early, and clinical manifestations of executive dysfunction are often associated with other pathologies, such as executive dysfunction that further leads to dementia.Executive dysfunction leads to the inability to complete complex behaviors, which limits social interaction among older adults also senior citizens.Deterioration of executive function is associated with mild cognitive impairment, with a significant decrease in executive function approximately 2 to 3 years before the diagnosis of dementia [1].Therefore, early intervention to prevent loss of executive function in healthy older people is an important issue.

The sport of Tai Chi is the treasure of China's traditional national sports.Compared to other types of Tai Chi, Type-24 Tai Chi has significant advantages. Specifically:1) 24-style Tai Chi Chuan is a set of simple and easy to learn and suitable form of physical fitness on the basis of traditional Yang's Tai Chi Chuan, in accordance with the principle of simplicity to complexity. For more than 60 years, the 24-style Tai Chi quan has a good mass foundation and a high degree of popularity.(2) Compared with the tai chi eight methods and five steps of medium and low intensity exercise [2], type 24 tai chi belongs to medium intensity aerobic exercise. And its energy metabolism is 3-4 METs, which meets the daily physical fitness needs of the elderly without chronic diseases. Compared with walking in daily life, the inverted brachi movement in the 24-style Tai Chi is a backward movement, and walking forward with our usual forward is a reverse movement, so the brain is needed to suppress the habit (forward movement) and make instructions;The cloud hand is a lateral movement, which is different from daily life and requires the brain to make non-automatic commands. In addition, learning the 24-style Tai Chi also requires continuous concentration. Therefore, it is believed that the practice and sustained concentration of this movement in the 24-style tai chi may help to improve the performance of executive function in the elderly.

Physical activity at the old age can not only keep healthy, but also strengthen the brain. An active physical lifestyle has the potential to prevent decreased executive function and dementia.A cross-sectional study [3] showed that older adults who underwent regular physical exercise showed better learning and memory function than sedentary older adults.Dr. Ottenbacher[4] documented physical activity in 1669 Mexican-American older adults and concluded that there was a significant positive correlation between physical activity levels and cognitive function after adjusting for age, sex, marital status, educational attainment, and comorbid health.The study of executive function was first discussed as part of the study of cognitive function. With the introduction of executive function and related theories, the research on executive function has gradually become a hot topic.Performance of performing functions in daily life is essential for the health of older adults.A study of 1690 participants on reported performance of executive function and risk of disease in older adults [5], showed that cumulative deficits in executive function were a powerful factor contributing to frailty in older adults, and also confirmed that executive profiles were a good predictor of adverse health events even in individuals over 65 years of age without cognitive impairment.Executive function is the thinking skill that helps reason, plan, solve problems, and manage life. Early executive function training in children can avoid widening the later performance gap.An intervention conducted by Nobuaki [6] et al. showed that short-term (8-10 minutes) high-intensity interval training had a positive effect on digital span backward (working memory test) tasks in children aged 8-12 years. Executive function is a complex set of cognitive and social-emotional abilities that allow us to maintain abstract reasoning, solve problems, change behavior in response to changes in the environment, and create behavioral plans [7-8].These tasks are coordinated by the prefrontal region, which is projected onto other cortex and

ISSN: 2688-8653

subcortical regions, forming an extensive network of neurons. If one of these areas is damaged, executive dysfunction can occur, which is closely related to the loss of functional capacity and quality of life in older persons [9-11].

With the advent of brain science in the 21st century, executive function has gradually become a research boom, and researchers have conducted experimental studies on the three sub-functions of executive function.Different exercise intensities have different effects on improving inhibition.In a study of the effects of different exercise intensities on inhibition, a study compared the effects of 30 minutes of basketball dribbling intensity on inhibition in primary school students and found[12] that exercise at moderate intensity was better in promoting the development of children's executive function.However, the results of the study by Zhao Jingguo and Zhou Jie [18] show that exercise energy consumption (75 to 275 Kcal) can better reflect the impact of exercise on cognitive inhibition ability than exercise time and exercise intensity.Older adults show a slowing trend in task switching with age, and the intact white matter of the frontal parietal lobe is the neural mechanism that affects the performance of conversion tasks [13].In a study of the effects of aerobic exercise on conversion function, a study showed that 27 average female college students performed better in the more-odd shifting task after 30 minutes of aerobic exercise on a power bike than in pre-experimental test results, demonstrating that 30 minutes of moderate-intensity exercise could improve conversion performance[14].Moderate-intensity physical activity lasting more than 20 minutes has the most significant effect on the conversion function of middle school students [15].Refresh performance is critical for athletes to learn motor skills to improve athletic performance.In a study comparing the executive function of middle-distance runners and table tennis players[16], the results of the refresh function 1-back task test showed that there was a significant difference in the response between the two groups compared with the control group, and only a significant difference in the 1-back test between the two groups, and the open exercise showed that the refresh function had an improved effect.

In recent years, under the impetus of the integration of sports and medicine, the study of 24 types of tai chi mainly (explores and highlights its health effects) its health effects to highlight its health effects."What is the intention of the detailed push? Longevity is not old", this sentence highlights the fitness function of tai chi.The 24-style Tai Chi exercise requires not only memory, but also a variety of advanced cognitive functions (such as perceptual speed, visual spatial abilities, attention, multitasking, and planning) to maintain posture stability. Correspondingly, the process of movement activates the associated brain areas, stimulates the excitability of brain cells, helps to strengthen the brain, maintains its perceptual function, and improves memory and executive function in the elderly [17].

The traditional Chinese culture represented behind the word tai chi is broad and profound, with a long history. The movement of Taijiquan echoes it from all respects, so Taijiquan is also known as "Zhequan". It is a kind of mind-body movement in which consciousness dominates the body, and this dominance has another synonym that can be interpreted as "control."That is, tai chi emphasizes a kind of control. Both tai chi movements and executive functions emphasize "control".In view of this, taking the fitness techniques of Taijiquan as the starting point, the common point of Taijiquan and executive function "control" is used as the starting point of the research to carry out corresponding research and discussion.In previous experiments, the effects of the 24-style Tai Chi movement on executive function have not been followed up, and this paper proposes for the first time a follow-up test that is measured again four weeks after the end of the experiment to test the fading of exercise.Pay attention to the hot spots of executive function research and gather the focus of the health of the elderly population in an aging society. Through the practice of the 24-style Tai Chi exercise, it is hoped to delay the brain cognitive degradation of the elderly with age, promote the development of the elderly towards healthy aging, and improve the quality of life of the elderly in their later years, in order to solve

ISSN: 2688-8653

the focus of people's attention in the process of aging society the main problem in the aging society.

2. Research Objects and Methods

2.1. Subjects

These elderly participants were recruited. The demographic information sheet was used to survey the participants' information and exercise routines. According to the study situation, 34 valid subjects were selected after excluding the unqualified data. Participants were aged 60-74 and in good physical condition, had no regular exercise habits and no tai chi-related experience.On the basis of this screening, the International Simple Intelligent Mental Status Examination Scale and the Montreal Cognitive Assessment Scale (Chinese Edition) were used for cognitive function screening. Those who passed the International Simple Smart Mental Status Check Scale (MMSE≥24 points) and the Montreal Cognitive Assessment Scale (MoCA≥26 points) were included in the study.Exclusion criteria include 1) those who have cardiac bypass and cardiovascular disease or other sports contraindications that make them unsuitable for type 24 tai chi exercises; 2) those with a history of cognitive impairment who have mental problems and are unable to cooperate with exercise and testing; and 3) those who participate in other sports at the same time.This study was approved by the Ethics Committee of Beijing Sport University. Participants who met the study inclusion criteria with written informed consent in the study were assigned to the Tai Chi and Control groups by using computer-generated randomization. A total of 37 participants took part in the baseline test. Ultimately, 34 participants, including 17 participants in the Tai Chi group and 17 participants in the control group, persevered through the study.

2.2. Experimental Group

Each concentrated exercise is 60 minutes, including 10 minutes of static pile Tai Chi Eight Methods to prepare for the action warm-up, 45 minutes of Tai Chi training, and 5 minutes of relaxation. Practice 5 times a week for 12 weeks. Exercise hours are from 8:00 to 9:00 every morning, and only the prescribed 24-style tai chi exercises are allowed during the experiment. Each training is taught by professionals.

2.3. Control Group

The control group maintained a normal daily life, allowing walking exercises 2-3 times a week for 30 minutes each time, and no type 24 tai chi or other exercise training was allowed during the experiment.

2.4. Measurement Tools

E-prime 2.0 is used to program and test the three sub-functions of the execution function as follows.

The suppression function was tested using a stroop task. The Stroop task required participants to determine the color of the font under interfering conditions (inconsistent meanings and color of words, such as the "green" word in red). This experiment measures the reaction time of participants under inconsistent conditions, and the shorter the reaction time, the better the ability to inhibit function.

The refresh function is measured by a 1-back task, and the smaller the reaction time when the test score is average, the better the refresh ability.

The conversion function is measured by more-odd shifting task, and the experimental result is that the average reaction time of the conversion condition and the non-conversion condition is subtracted, and the smaller the difference, the better the conversion ability.

ISSN: 2688-8653

3. Results and Analysis

3.1. Basic Information of the Subject

The final number of people included in the statistics was 34. There were 17 people in the Tai Chi group (14 males and 3 females) and 17 people in the control group (2 males and 15 females); the average educational level of the subjects was above junior high school. The subject demographic information is shown in Table 3. There was no significant difference in age, height, weight, years of education, MMSE score MoCA score and other factors before the experiment, that is, there was no statistical difference in the T test of the relevant data of the two groups.

Table 1. Basic information of subjects and statistical results of general cognitive ability (n=34)

Constituencies	Tai Chi group n=17 Control group n=17	Tai Chi group n=17 Control group n=17	t	p
Age (years)	64.6±4.6	64.4±4.2	-0.68	0.947
Height (cm)	161.0±6.9	162.0±6.7	0.354	0.728
Weight(kg)	64.0±9.2	61.3±6.6	-0.839	0.414
Years of education	9.8±2.7	9.5±3.8	0.145	0.887
MMSE score	28.1±1.1	27.8±1.1	0.720	0.482
MoCA score	26.4±0.6	26.3±0.6	0.946	0.358

3.2. Comparative Analysis Results of the Stroop Task Test between the Two Groups before and after the Experiment

The test scores of the Taijiquan group and the control group performing each sub-function before and after the experiment were tested by an independent sample T test, and the differences between the two groups were tested by using the group as the grouping variable.

Table 2. Comparative analysis results of the stroop task test before and after the experiment

	stimulate	Tai Chi group Control group	Tai Chi group Control group	T-value	P-value
Before the experiment		579.14±190.02	586.34±193.67	-1.316	0.188
Reaction time (ms)	unanimous	564.87±171.26	565.43±152.165	-0.083	0.934
	inconsistency	591.70±204.34	604.64±222.29	-1.576	0.115
After the experiment		550.98±158.85	602.06±215.35**	9.880	0.000
Reaction time (ms)	unanimous	535.11±130.80	585.53±205.96**	-6.795	0.000
	inconsistency	564.73±178.73	616.42±222.36**	-6.626	0.000
Pre-experimental		0.87±0.33	0.86±0.34	1.238	0.216
Correct rate (%)	unanimous	0.91±0.28	0.87±0.33**	3.664	0.000
	inconsistency	0.83±0.37	0.85±0.35	-1.271	0.204
after experiment		0.94±0.24	0.85±0.35**	-9.502	0.000
Correct rate (%)	unanimous	0.97±0.15	0.85±0.35**	10.486	0.000
	inconsistency	0.91±0.29	0.85±0.35**	4.426	0.000

Looking at the stroop task test results from Table 2, through the analysis of the baseline test before the experiment, the analysis results show that there is no statistical difference between the test results of the two sets of inhibition ability tasks (p>0.05). In the stroop task test, the

ISSN: 2688-8653

experimental group performed better than the control group.Under the conditions of consistent stimulus type, the response rate of the experimental group decreased and the accuracy rate increased; the response of the control group became longer and the accuracy rate decreased; under the condition of inconsistent stimulation type, the experimental group also showed a decrease in response, the accuracy rate was improved, and the accuracy rate was increased when the control group responded, and the accuracy rate did not change significantly.It was shown that the change in response time and accuracy rate of the 12-week 24-style Tai Chi exercise to the inhibition ability task test in the experimental group was significant compared with that in the control group.

3.3. Comparative Analysis Results of the 1-Back Task Test between the Two Groups before and after the Experiment

Table 3. Comparative analysis results of 1-back task test before and after the experiment

		Tai Chi group Control group	Tai Chi group Control group	Z-value	P-value
Reaction time (ms)	Before the experiment	781.00±348.15	770.65±306.19	-1.794	0.073
	After the experiment	690.74±241.35	758.76±306.61**	-7.384	0.000
Accuracy rate (%)	Before the experiment	0.77±0.49	0.76±0.42	-0.076	0.940
	After the experiment	0.85±0.36	0.81±0.39**	-2.918	0.004

Looking at the 1-back task test results from Table 3, through the analysis of the pre-experimental baseline test, there is no statistical difference in the test results of the two sets in the refresh capability task ($p>0.05$).In the 1-back task test, the experimental group performed better than the control group. Specifically, the experimental group decreased when the reaction was 12 weeks later, and the accuracy rate was improved; the control group decreased when there was a response, and the accuracy rate was improved.The performance of both groups has a positive trend, but it can be seen that the experimental group has changed more than the control group. And there were very significant changes between the two groups in the reaction time ($p<0.01$) and accuracy ($p=0.004$) in the post-test.It was shown that the change in response time and accuracy rate of the 12-week 24-style tai chi exercise to the refresh ability task test in the experimental group was significant compared with that of the control group.

3.4. Comparative Analysis Results of the More-Odd Shifting Task Test between the Two Groups before and after the Experiment

Judging the test results of the size task from Table 4, the test results of the two sets of tests were shown to be no statistical difference ($p>0.05$) through the pre-experimental baseline test.In the size determination task, the test scores of the experimental group and the control group vary differently.Specific realization was that the experimental group became slightly longer in the reaction after 12 weeks, but the accuracy rate was improved; the control group showed a decrease in the reaction, but the accuracy rate decreased. It showed that after 12 weeks of 24-style tai chi practice, there was no significant difference in the size response ($p=0.304$) between the two groups, and there was a significant difference in the correctness rate ($p<0.01$).The results of the parity task test were judged, and the pre-experimental baseline test showed no statistical difference between the two sets of test results ($p>0.05$). After 12 weeks, there was no significant difference in the accuracy of the parity and accuracy between the two groups. However, the accuracy of the test results in the experimental group and the control group was improved compared with the previous test, and there was a downward trend in the reaction of

ISSN: 2688-8653

the experimental group after the test, and the reaction of the control group did not drop and rise. The results showed that the change in reaction time (p=0.768) caused by the 12-week 24-style Tai Chi exercise on the parity task test in the experimental group was not significant compared with that in the control group. The correctness of the post-test of the two sets of test tasks performed better than the previous test, but there was no significantity significance between the groups (p=0.550).Mixed judgment task test results. Through the pre-experimental baseline test analysis, no statistical difference between the two sets of test results was shown (p>0.05). After 12 weeks of 24-style tai chi practice, the experimental group performed better than the control group. Specifically, the accuracy rate decreased when the experimental group mixed judgment reaction, and the accuracy rate increased; the reaction time in the control group became longer, and the accuracy rate performance increased slightly.It was shown that the change in reaction time (p=0.013) and accuracy (p=0.025) caused by the 12-week 24-style tai chi practice on the conversion ability task test in the experimental group was significant compared with that in the control group. There was a significant difference between the changes before and after the exercise intervention in the experimental group and the changes before and after the control group without intervention, that is, the 12-week 24-style tai chi exercise exercise was effective.

Table 4. Comparative analysis results of the more-odd shifting task test before and after the experiment

More		Tai Chi group Control group	Tai Chi group Control group	Z-value	P-value
Reaction time (ms)	Before	539.23±132.02	536.04±168.32	-1.669	0.095
	After	541.34±153.29	529.97±194.98	-1.027	0.304
Accuracy rate (%)	Before	0.92±0.26	0.91±0.29	-1.412	0.158
	After	0.92±0.27	0.84±0.37**	-5.933	0.000
0dd				Z-value	P-value
Reaction time (ms)	Before	694.52±222.15	692.84±171.45	-1.588	0.112
	After	693.54±154.50	694.11±231.17	-0.295	0.768
Accuracy rate (%)	Before	0.88±0.32	0.87±0.33	-0.948	0.343
	After	0.93±0.26	0.92±0.27	-0.598	0.550
shifting				Z-value	P-value
Reaction time (ms)	Before	862.64±423.66	874.89±368.19	-0.943	0.346
	After	854.85±290.79	902.07±373.82*	-2.479	0.013
Accuracy rate (%)	Before	0.68±0.46	0.65±0.47	-1.492	0.136
	After	0.76±0.42	0.68±0.46*	-2.240	0.025

3.5. Tai Chi Group before and after the Experiment to Perform Functional Test Results in the Group

The paired sample T test analysis was carried out in the Tai Chi group, and the normal inconsistencies were corrected by the Mann-Whitney U test in the nonparametric test, and the results were as follows.

As can be seen from the above table, after the analysis within the group, the results show that after 12 weeks of 24-style Tai Chi practice intervention, the inhibition ability and refresh ability task tests were very significant in terms of response time and accuracy rate (p<0.01), and the response time of each task was significantly lower than before the experiment, and the accuracy rate was significantly improved compared with before the experiment.In the conversion ability task test, the comparative size task was not significant in terms of reaction time and accuracy rate (p>0.05); in judging parity tasks, there was no significant difference in reaction (p>0.05),

ISSN: 2688-8653

but the accuracy rate was significantly improved compared with before the experiment, and there was a significant difference (p<0.05);In the mixing task, there was also no significant difference in reaction time (p>0.05), but there was a significant difference in accuracy (p<0.05). The results showed that 12 weeks of 24-style tai chi practice had an improving effect on the correct rate of performing functional tasks in the elderly.

Table 5. Comparative analysis results of the functional task test in the group before and after the experiment

		Stroop task testing			
	stimulate condition	Forward test	Post-testing	T-value	P-value
Reaction time (ms)		579.14±190.02	550.98±158.83	6.521	0.000
	unanimous	564.34±171.83	533.22±125.52	5.173	0.000
	inconsistency	591.70±204.34	564.73±178.73	4.228	0.000
Accuracy rate (%)		0.87±0.33	0.94±0.24	-9.505	0.000
	unanimous	0.91±0.28	0.97±0.16	-6.303	0.000
	inconsistency	0.83±0.37	0.91±0.29	-7.129	0.000
	1-back task testing				
	Forward test	Post-testing	Z-value	P-value	
Reaction time (ms)	781.00±348.15	690.74±241.35**	-9.079	0.000	
Accuracy rate (%)	0.77±0.49	0.85±0.36**	-6.405	0.000	
	More-odd shifting task testing				
	Forward test	Post-testing	T-value	P-value	
Size task reaction time (ms)	539.23±132.02	541.34±153.29	-0.379	0.705	
Parity task reaction time(ms)	694.18±222.07	693.54±154.50	0.079	0.937	
Mixed task reaction time(ms)	862.64±423.66	854.85±290.79	-0.782 (Z-value)	0.434	
Size task accuracy(%)	0.92±0.26	0.92±0.27	0.437	0.662	
Parity task accuracy (%)	0.88±0.32	0.93±0.26**	-3.629	0.000	
Mixed task accuracy (%)	0.68±0.46	0.76±0.42**	-4.763 (Z-value)	0.000	

3.6. Perform Functional Test Results in the Control Group before and after the Experiment

As can be seen from the above table, after 12 weeks of time in the control group, the results of the intragroup analysis showed that the inhibition ability stroop task test response showed a very significant change (p<0.01) compared with the pre-experimental test results, the accuracy rate was not significant (p>0.05), of which the consistency conditional response was very significant (p<0.01), and the rest were not significant, and it can be seen from the numerical values that this significance is due to the significant change in the group brought about by the longer reaction time.In the refresh capability task test, the response was significant (p<0.05) and the correct rate was very significant (p<0.01).In the conversion ability task test, the control group did not have a significant difference in the response in the judgment size task (p>0.05), while the correctness rate showed a decreasing trend with a very significant difference (p<0.01); the test results of the parity task showed the same analysis results, that is, there was no significant difference in reaction (p>0.05) and the accuracy rate had a very significant

ISSN: 2688-8653

difference ($p<0.01$); in the mixed task, there was also a significant difference in reaction ($p>0.05$), However, there was a very significant difference in accuracy ($p<0.01$).

Table 6. Comparative analysis results of functional task tests in the group before and after the experiment

Stroop task testing					
	stimulate condition	Forward test	Post-testing	T-value	P-value
Reaction time (ms)		586.34±193.67	602.06±215.35**	-2.798	0.005
	unanimous	565.43±152.16	585.53±205.96**	-3.029	0.003
	inconsistency	604.64±222.21	616.52±222.31	-1.600	0.110
Accuracy rate (%)		0.86±0.34	0.85±0.35	0.819	0.413
	unanimous	0.87±0.33	0.85±0.35	1.004	0.316
	inconsistency	0.85±0.35	0.85±0.35	0.245	0.806

1-back task testing				
	Forward test	Post-testing	Z-value	P-value
Reaction time (ms)	770.65±306.19	758.76±306.61*	-2.043	0.041
Accuracy rate (%)	0.76±0.42	0.81±0.39**	-3.339	0.001

More-odd shifting task testing				
	Forward test	Post-testing	T-value	P-value
Size task reaction time (ms)	536.04±168.32	529.97±194.98	0.832	0.405
Parity task reaction time(ms)	692.84±171.45	693.36±232.09	0.059	0.953
Mixed task reaction time(ms)	874.89±368.19	884.78±360.58	-1.127 (Z-value)	0.260
Size task accuracy(%)	0.91±0.29	0.84±0.37**	5.267	0.000
Parity task accuracy (%)	0.87±0.33	0.92±0.27**	3.969	0.000
Mixed task accuracy (%)	0.65±0.47	0.72±0.45**	-3.823 (Z-value)	0.000

3.7. Tai Chi Group Performed Functional Test Results Four Weeks after the Experiment

As can be seen from the above list, 12 weeks of 24-style tai chi exercise exercises have an improving effect on the performance of executive function in the elderly. But can the benefits obtained from it be maintained in the training of the elderly in their own later years? Therefore, after the 12-week intervention, the elderly in the subjects underwent a month of self-training.The effect of the exercise was checked during this time to see whether the changes caused by the elderly participants exercising with what they had learned could show the stability of the test results in the measurement of the relevant task again after one month without the guidance of the main participant.Check whether the effect of the 24-style tai chi exercise on the executive function of the elderly has a lasting effect.After the end of the 12-week experiment, the Tai Chi group will carry out another one-month exercise, and the main test at this stage will no longer participate in the guidance of the Tai Chi Group's 24-style Tai Chi Exercise, and the exercise time will remain the same as during the experiment, that is, 5 days of practice, 2 days off, and the duration of each exercise is 1 hour.

After four weeks, 2 people in the tai chi group quit and eventually 15 people stuck to the exercise. There are 15 elderly participants in the autonomous practice phase, so it is necessary to select and correspond to the previous elderly number before performing the analysis of

ISSN: 2688-8653

repeated measurements of variance. The executive function measurement data of these 15 people were described and counted, and the results were as follows.

Table 7. Test the results of the analysis in the group again after the experiment

	Forward test After test	Forward test After test	Test again
Stroop task Reaction time (ms)	587.22±197.37	549.59±162.18	572.03±190.01
Stroop task Accuracy rate(%)	0.86±0.34	0.93±0.24	0.97±0.17
1-backtask Reaction time(ms)	788.00±335.75	687.42±245.52	710.60±279.13
1-backtask Accuracy rate(%)	0.80±0.48	0.85±0.35	0.89±0.30
Size task reaction time (ms)	534.72±130.15	536.66±154.69	509.36±198.77
Parity task reaction time(ms)	695.10±226.36	687.72±157.20	696.71±235.83
Mixed task reaction time(ms)	898.59±404.14	852.13±292.91	900.39±281.46
Size task accuracy(%)	0.92±0.26	0.91±0.28	0.87±0.33
Parity task accuracy (%)	0.88±0.32	0.93±0.26	0.86±0.34
Mixed task accuracy (%)	0.69±0.46	0.76±0.42	0.83±0.37

The above results show that in the executive function related tests conducted after the autonomous training stage, the test results of the three sub-functional tasks basically show a good trend, and the results also show that insisting on the 24-style tai chi exercise can have a good role in promoting the executive function of the elderly.

4. Conclusion

Through 12 weeks of 24-style tai chi practice, the correct rate of the older people's inhibition ability, refresh ability and conversion ability task test was improved, indicating that the brain became more efficient in dealing with problems over a period of time, and the brain’s flexibility was improved to a certain extent. And this improvement advantage already existed in the test after one month, that is, 12 weeks of 24-style Tai Chi exercise exercises can be effectively maintained.

12 weeks of 24-style tai chi exercises had a positive effect on improving the response rate of the elderly to inhibit function and refresh functional tasks, but did not have a positive effect on the reaction speed of conversion function tasks. In the test results after one month, the decrease trend in the response of the suppression function and refresh function tasks was still obvious, and the decrease trend when reacting in the conversion function task was not obvious.

Practice 24 type tai chi exercise has obvious effects on improving the overall executive function of the elderly and its core sub-function performance, and this improvement effect is not a short one-time, but has a continuous, this improvement effect is not transient but lasting. Longer the practice time, the better the effect of preventing the decline of the executive function of the elderly.

5. Recommendations

Long-term practice of 24-style tai chi exercise is of great benefit to the elderly.First of all, the stylistic characteristics of the 24-style Tai Chi exercise are suitable for the elderly group to

ISSN: 2688-8653

practice. The 24-style Tai Chi exercise can unblock the meridians, improve circulation, concentrate and improve the body's immunity without consuming too much energy.Secondly, the 24-style Tai Chi exercise belongs to medium intensity aerobic exercise, starting from the daily physical fitness needs of the elderly population, this set of boxing is suitable for the elderly without chronic diseases as a daily and long-term exercise.Finally, the long-term practice of 24-style tai chi has improved the elderly population in various ways. Based on the hot spots in the study of tai chi exercises in recent years, this paper focuses on the executive function in brain function. The effect of 24 types of tai chi exercises on executive function in the elderly population was discussed, and the results of the study showed a positive trend. The performance of executive function is crucial to the health of the elderly, so it is recommended that the elderly group exercise the 24-style tai chi exercise in the long term.

6. Research Deficiencies and Recommendations

Due to the limited experimental subjects, no aerobic control group, such as the square dance group, was set up in this paper. And the sample size was also small, so the adoption of the research results in this paper should be cautious. The experimental research environment is conducted in a relatively closed environment, with good air quality, beautiful environment and suitable for the elderly. Hongqiling Farm belongs to the county-level rural area, and unlike the previous rural area , the elderly enjoy their old age here, so the results of this study are slightly different from the test results of the urban elderly.

The subjects of this study are older adults with healthy levels, and follow-up studies can expand the division of the elderly population, such as a wider range of participants with different levels of cognitive function. The 24-style Tai Chi exercise may provide a safe non-pharmacological approach to enhancing executive function in older adults. The experimental duration of this study was 12 weeks, and the time to examine the results of the continuity benefit of 24 types of tai chi exercises was 4 weeks. More and larger trials, as well as longer follow-up periods and standardized measures of neuropsychological outcomes, are needed before more definitive conclusions can be drawn.

In the aging process, the elderly are more susceptible to active interference from previous experiences. There is no cognitive understanding of new things, and there is a reluctance to accept new things. At the same time, in today's rapidly developed society under the information era, updated and open development process of society, it is possible to connect with society only through mobile phones. Therefore, the background factors of the rapid development of the times have a certain impact on the development of executive function of the elderly. Although the control group did not practice 24-style tai chi, in the era of short video platforms, people's channel to accept information is diversified, which has a certain impact on the research results.

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