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Effects of Chan-Chuang on Physical and Mental Health: A Literature Review

Tao Jiang, Hansen Li[a], Xue Dong[a], Guodong Zhang[a*]

a. Institute of Sport Science, College of Physical Education, Southwest University, Chongqing 400715, China

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Abstract

Chan-Chuang is a traditional Chinese mindfulness training, which has becoming an emerging method to improve public health. As yet, a range of studies have been conducted to reveal the effects of Chan-Chuang, and potential metal and physical benefits have been identified. This essay aimed to make a comprehensive review on health benefits of Chan-Chuang and bring practical indications for complementary therapy. A systematic searching was performed via databases including CNKI (in Chinese), Weipu (in Chinese), Wanfang (Chinese), Baidu Academic (Chinese) and Web of Science. There are 297 articles in total and 46 articles were finally included. Results suggested that Chan-Chuang may contribut to brain synchronization, reducing spinal pain, and protecting knee joints. Psychologically, Chan-Chuang may also promote cognitional and emotional state.

Key Words: Chan Chuang, Intervention, Physical and Mental Health, Mechanism

a. Guodong Zhang, Email: lygd777@swu.edu.cn

Introduction

Chan Chuang is a traditional health-preserving skill to exercise and strengthen the body by standing still in accordance with the physiological requirements of the human body (Zhang 2018). Different from the general sports, Chan Chuang is an exercise method that unifies exercise and rest. It can restore body function during exercise. In the process of Chan Chuang exercise in order to achieve the goal of exercise, people are mostly supposed to rely on postures, breathing and calmness. The exercise process requires the limbs to maintain stable movement and adjust their body posture independently to keep body balance and calm state regardless of the external influence. This training allows the participants to calm down slowly, while also reducing feelings of anxiety and negative emotions, which makes the person to be in harmony with the external environment. Besides beginners can enjoy considerable curative effects even if they cannot reach the state of spiritual freedom. The method is simple and easy to learn, which is relatively free from time and place restrictions, so it has a wide range of applications. Because of this, the history of research on standing stance exercises has been more than 70 years in China (Lee 2014).

With the growth of aging population and the wide spread of traditional Chinese martial arts, the benefits of Chan Chuang have attracted more attention. From 2000 to 2020, more than 200 relevant studies have emerged, and there has been a significant increase since 2015. Chan Chuang has gradually transformed from a traditional martial arts practice project into a clinical medical rehabilitation treatment method. Studies have shown that Chan Chuang can play a role in assisting and guiding treatment in clinical medicine, including improving chronic bone, joint symptoms and cardiovascular health. At present, physical dysfunction and mental disorders have become major social problems. Under this background, traditional stance exercises organically combine medicine and traditional martial arts, through certain stance exercises to increase the load of physical activities, and using a static exercise to strengthen the perception of the brain and the body. Promoting physical and mental balance, and reasonably alleviating the influence of external interference factors on the individual's body and mind. In the new environment, it provides new content and important opportunities for improving the level of national physical fitness and elevating public health.

So far, although there are many Chan Chuang intervention studies, the related researches just presented a generalized statement and lacked an overall description of the functions of Chan Chuang. Therefore, in this study we have arranged and analyzed the related studies, and trying to explain the benefits and mechanisms of the Chan Chuang more comprehensively and systematically, in order to help the public better understand the movement of Chan Chuang, providing for an actual development and spread of Chan Chuang with favorable conditions.

Research Methods

The keywords were searched via Chinese search engines including Baidu, as well as databases including CNKI (in Chinese), Wangfang (in Chinese) and Web of Science. Paper materials including books and newspapers are also collected to find relevant clues (Figure 1).

Through the domestic database CNKI (in Chinese), Weipu (in Chinese), Baidu (in Chinese), Wanfang (in Chinese) searched with "Zhan Zhuang" and "Zhuang Gong" “Intervention” “, Physical and mental health” “Mechanism” as keywords. 297 documents were retrieved about Chan Chuang, and more than 90 available articles were screened. The keyword "Chan Chuang" was used through Web of Science. There were 14 foreign documents, 5 of which were available.

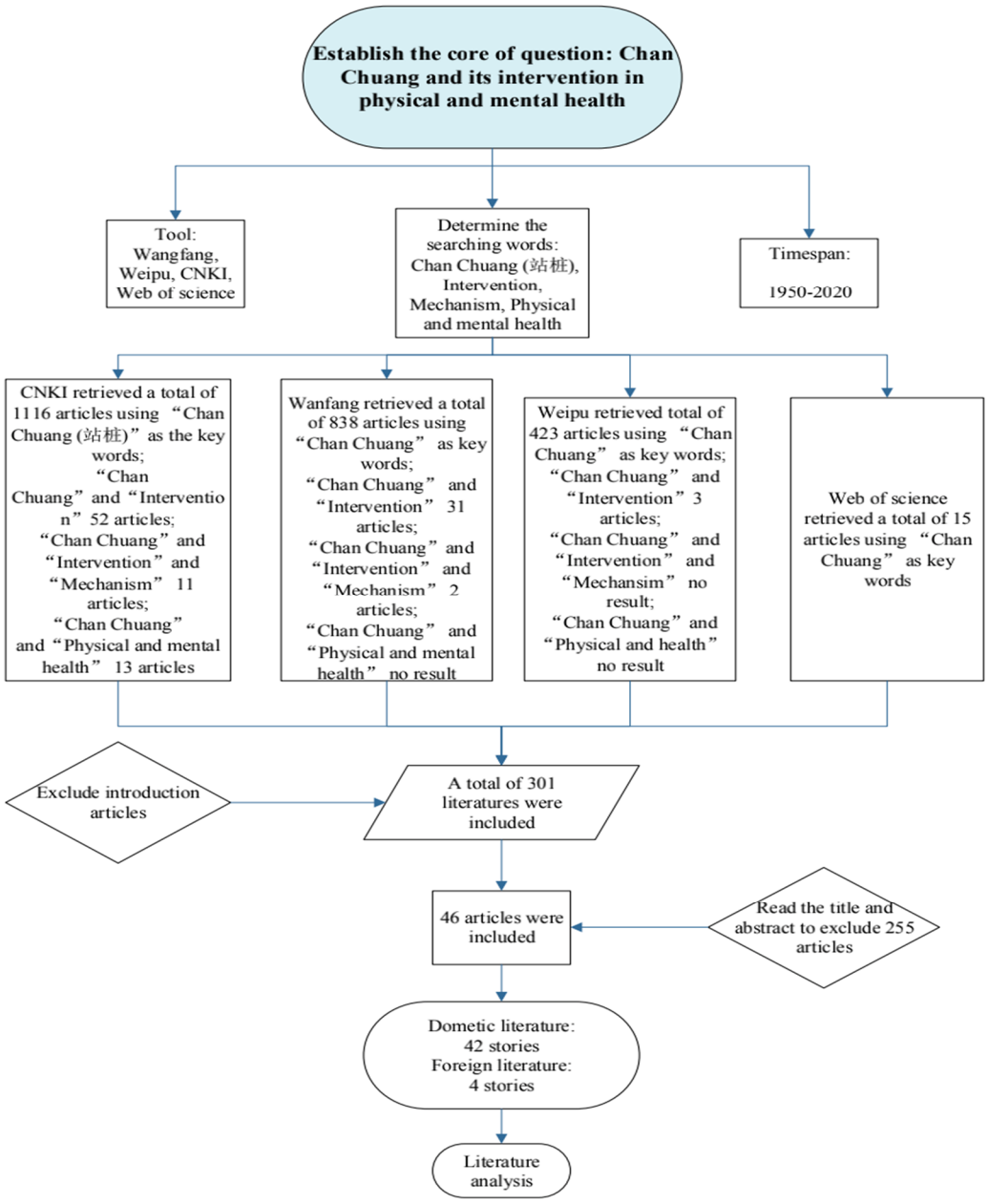

Figure 1. Flowchart of searching process

Result

Types of Chan Chuang Intervention

Chan Chuang includes many types, such as “Hun yuan pile” [浑圆桩], “Four-level pile” [四平桩], “Three-body pile” [三体式桩], “Virtual step pile” [虚步桩], “Lunge pile” [弓步桩] and so on (Figure 2). In a broad sense, Chan Chuang can be divided into two categories: dynamic pile and static pile (Table 1).

Figure 2. Horse step pile (left) and Hun yuan pile (right)

Table1. Types and characteristics of Chan Chuang

Types of Chan Chuang	Features
Static pile	Mainly static movement (maintaining and specific posture)
Dynamic pile	Dynamic mode is the main
Dynamic And Static Pile	Transform into static exercises after dynamic mode

The purpose of dynamic pile is to seek “stillness while moving”. When practicing, the dynamic mode is mainly used, including general martial arts routine exercises and single repetitive exercises. The main purpose of this type is to gradually calm the participants down, reducing anxiety and negative emotions, then focus on the practice of dynamic pile to get rid of impetuous air and keep their spirits clear. Dynamic pile intervention refers to the exercise method formed by the body’s cohesion and cooperation through certain stance movements to form an own system. During the exercise, the movement is slow and a certain step movement is continuously used to make the body adapt to breathing and moving (Duan 2008).

The Chan Chuang that we usually describe is static pile, which aims to “Seek”

movement in stillness and strengthen the mind-body relation through static exercises. It is not only a physical exercise activity, but also a way to get self-cultivation. Therefore, there is a saying that "Excise is inferior to standing". Static pile, the core practice of Chan Chuang, is the main method of intervention. During the intervention, the experimenters are required to enter a resting state, which is called "Quiescence" [Yang et al 1994]. Static pile refers to the state where the body's trunk and limbs remain still, and exercise the body through the force of the body's gravity, posture, breathing, and psychology. Nowadays, Chan Chuang is mostly applied to clinical medicine. Combining it with a large number of clinical trials, it's medical function can be explored.

The static and dynamic Chan Chuang intervention is a combination of two exercise methods. There are both the foreshadowing for the dynamic pile to guide the body into the exercise state, and the static pile enter into the mental free exercise method. In this condition, based on the combination of these two, the exercise quality can be improved in a positive way (Table 2).

The effect of Chan Chuang

Benefits of Static Pile Intervention

In the practice of static pile, the body's nervous system is the dominant physiological activities. When the nerve exercises, the function of regulation is enhanced, and the function of various physiological activities of the human body is improved [Zhang 2018; Wen 2016]. Studies have shown that long-term static pile intervention can adjust the synchronization of the human brain and enhance its ability to prevent intervention and emotion regulation [Shan et al 2003; Yang 1993; Lv 2019]. For patients with insomnia, static pile exercises can effectively improve their own sleep quality and increase sleep duration [Wen 2016]. For patients with chronic knee injuries, shoulder, lumbar disc hernia and KOA, regular static pile can play a role in the rehabilitation of chronic symptoms and improve the patient's mood [Hu&Lu 2019; Jiang 2009; Zhang, Zhao 2012; Zhao 1988; Tu et al 2014]. Researches in recent years have found that static pile intervention can also have corresponding promoting benefits for college students. At the same time, the college students who have the feeling of anxiety and depression, it can improve depression, anxiety and sleep quality. It can play a role as traction for college students with unbalanced spine, and has a significant positive effect on the state of the spine, obviously promotes the physical condition of college students, and improves the function of the cardiopulmonary and cardiovascular system [Zhang 2018; Lv 2018; Zhou 2015]. The acupuncture treatment, combined with the static pile station guidance experiment, found that stance exercises can relieve the swelling of the knee joint, and the joint range of motion has been greatly improved to the original extent have big improvement in the level, walking functional recovery [Wang, Chen 2017].

Table 2. Benefit of Chan Chuang

Species	Benefit
Static pile	Regulate the nervous system, improve mood and sleep
	Prevent and treat knee joints, improve physical fitness and improve cardiopulmonary function
Dynamic pile	Enhance balance ability and promote blood flow
	Relieve lumbar disc herniation
Dynamic And Static Pile	Enhance the synchronization of brain nerves,
	Prevent high blood pressure, improve lower limb strength

Benefits of dynamic pile intervention

Dynamic pile exercises can strengthen the bones and muscles. The traditional Chan Chuang method is self-compiled according to the actual needs, and specific reciprocating actions are added, just like the Taichi stance type, with increased left and right shaking. Chan Chuang with increased difficulty of stability can effectively improve the balance ability of the elderly and reduce the possibility of falling down oneself in daily life (Chen 2016). The dynamic pile can be used as the basic part of the warm-up activity before the Chan Chuang exercise. It mobilizes the body's blood through the slow movement rhythm, which can pave the way for the static pile to enter the stillness (Fang 2014). Appropriate static and dynamic pile method can also improve one's own antagonism, and under a certain force, the body can adjust to antagonize the external force (Qing 1989]. The dynamic pile guides the specific compound movements of "Fairy playing piano", "Hands supporting the sky", "A pillar optimizing the sky", "Standing in the sky", "Clearing and reducing turbidity", after practicing, it can relieve and reduce the pain of lumbar disc herniation, preventing recurrence, and balance the muscle strength on both sides of the back (Zhang 2012)

Benefits of Dynamic and Static Pile Combined Intervention

A number of early studies have shown that the combination of static pile and dynamic pile intervention can enhance the synchronization of brain electricity and the ordering of the brain. According to the Qigong book "*Yangzhou Qigong"*, the dynamic and static combination can be used to prevent and treat hypertension patients. In 2010, Liang Z.S. also studied the effect of combining static and dynamic pile on the treatment of hypertension, and found that Chan Chuang had antihypertensive effects for hypertensive patients, which can improve heart function, enhance the ability of action, and prevent cardiovascular disease. The combined exercises of dynamic and static pile can also increase the muscle fiber thickening of the lower limbs in the middle-aged and elderly people, and at the same time enhance the synchronous

movement of the hip joint, waist and elbow joints, improving the flexibility and coordination of the body for the elderly, and relieve the condition of excessive use of the brain and nervousness (Lu 2013; Li 2016).

Chan Chuang intervene in the body mechanism

The Mechanism of Chan Chuang Intervention

Chan Chuang intervention in physical and mental health is mainly through two parts of the body's intervention. One is intervening on the physiological dimension of the body. It includes good adaptation to the specific stimuli of the body's various organ systems. The other is the adjustment on the body's psychological dimension, which through the specific stimulation of the body's physiology, and the benign adaptation caused by it can lead to the neurological and cognitive improvement.

The Mechanism of the Influence of Chan Chuang on Brain Synchronization

The effect of Chan Chuang on the brain is produced by changing the alpha wave of the brain. The longer intervention of Chan Chuang is the wider spread of alpha wave in the brain would be (Yan 2019). When the body is doing this exercise, the brain controls its activity by autonomously adjusting the alpha waves in the HRV time domain, and mobilizes the brain to enter the tranquility to produce a positive synchronization tendency (Lv 2019). When the alpha wave is enhanced, the beta wave, theta wave, and the delta wave are all significantly decreased or disappeared (Shan,Li 2003]. Even though the different frequencies of the brain wave diverging from different regions of the brain out, the adjustment of brain regions can be made by the static exercise of Chan Chuang. Enhanced alpha waves represent increased synchrony in the cerebral cortex, which makes quieter in tranquility and more excited when awake. Moreover, alpha waves have a positive correlation with the degree of quietness, making the brain more coherent and synchronized (Yang 1993; Lv 2019; Shan 2003; Yan 2019). It is this way of standing exercises that makes the brain and the body adjust to each other, so as to stabilize the synchronization of the brain.

Table 3. The mechanism of Chan Chuang intervening in the body

Physiological applications	Mechanism
Brain synchronicity influence mechanism	Chan Chuang→The brain actively regulates the time domain of HRV→Enhances the α wave and the β，θ，γ wave significantly decreased and disappeared→Increased synchronization of the cerebral cortex (more clam in a quiet state, more excited in a awake state)
Core muscles influence mechanism	Chan Chuang→The exercises will stimulate the muscles on both sides of the abdomen to receive the corresponding load→Constantly stimulate the erector spine, external oblique muscles, transverse abdominis, rectus abdominis and multifidus under static condition→Increase muscle strength of small muscle groups→Substantially improve core muscle strength
The mechanism of traction spine	Chan Chuang→A fixed posture can counteract the physical curvature of the back→Brain synchrony enhance to promote the body's degree of relaxation→Blood flow to accelerated, the back muscle are stimulated, muscle strength enhancement, conscious initiative to relax→The angle between the vertebrae is improved and the spine is in a more stable state
Knee joint prevention mechanism	Chan Chuang→Stimulate tissue around the knee→The quadriceps muscle is stimulated for isometric contraction→Quadriceps muscle strength improvement→Improved joint stability and pain
Psychology application	Mechanism
Cognitive mechanism	Chan Chuang→The hippocampal nerve cells in the hippocampus structure of the brain proliferate, the morphology of granular cells in the dentate gyrus of the hippocampus changes and the hippocampus of the brain increase in size→Promote the expression of BDNF protein and mRNA→Increased levels of hippcampal protein and neurotransmitters in the brain→Enhance brain mitochondrial activity→Remodeling and improvement of the brain nerves
Emotional mechanism	Exercise intervention (Chan Chuang)→Promote the body's production of testosterone, norepinephrine, GABA and adrenaline→Testosterone stimulates the body's production of the brain derived neurotrophic factor→Elevated levels of

GABA act as an antidepressant and BDNF improves cognition

The Mechanism of Zhan Chuang on Core Muscles and Lumbar Traction

The effect of Chan Chuang on the core muscles is to stimulate them on both sides of the body's abdomen to get the corresponding load through the exercises in the standing posture (Liu 1996]. Result from the difference between the core strengths of the both sides of the body, the erector spinae, external obliques, transverse abdominis, rectus abdominis and multifidus can be stimulated during standing exercises, and then exercised the deep-seated small muscle groups in the core muscles, which can have a substantial increase in core strength. Repeated stimulation through fatigue stacking can cause long-term increase in core strength (Zhou 2018). It also stabilizes the balance and coordination of related joints in the core parts of the body and the overall balance.

In terms of spinal traction, maintaining a fixed posture during the exercise can offset the physiological curvature of the spine and lumbar spine. The enhancement of the brain's alpha wave in the resting state can make the body and the brain in a quiet and calm empty condition (Yan 2019). Chan Chuang lets the body to relax completely. Take spinal imbalances for example, scoliosis of the spine of each section can be relaxed by the exercise, and it is conducive to local blood flow circulation, recovery from physiological bending, enhancing the stability of the spine on both sides of muscle strength balance. Coupled with the active adjustment of consciousness to relax the limbs, it can noticeably improve the angle between the vertebral bodies and make the upright spine more stable (Zhang, Zhao 2012). For patients with lumbar intervertebral disc disease, the muscles on both sides of the back are constantly stimulated during the intervention process, and finally the muscles of the back reach a balance of strength and achieve a balance of muscle building. Long-term exercise can also enhance the practicers' tolerance for pain, from subjective to objective self-regulation, and is plays the role of pain relief from the cognitive level.

Rehabilitation Mechanism of Chan Chuang on Knee Joint

Chan Chuang exercise can play a certain rehabilitation effect on knee joint injuries. The mechanism of Chan Chuang to improve the knee joint is to stimulate the tissues around the knee joint through standing posture exercises, adapting to the initial pain and make a positive change. The quadriceps is an important body structure that stabilizes and protects the knee joint, which is very vital for the movement of the entire knee joint. When the knee is injured,

its muscle strength will decrease and the stability will be weakened. Chan Chuang exercises are static exercises that can maximally improve muscle strength to a certain extent, and thus make the stability and pain of the knee joint benignly improved (Jiang 2009). Many studies have shown that a short-term upright standing posture can as well effectively stimulate the quadriceps and hamstrings. After many exercises, the power of quadriceps can be gradually strengthened (Yin 1984; Tu 2014).

Cognitive Mechanism

Relevant studies have shown that long-term piles intervention can have a benign improvement in subjective cognition (Du 2019; Guo 2019). In contrast, the effect of short-term piles exercise is not obvious (Wu 2019). An effective intervention process requires at least twelve weeks of Health Qigong exercises. When the intervention reaches eight weeks, the human body's visual and perception can be significantly improved. When the intervention time reaches twelve weeks, an obvious difference can be obtained. To reach higher levels, longer intervention time is required, such as twenty-four weeks of intervention time (Guo 2019). The main mechanisms of Chan Chuang to improve cognition include promoting the proliferation of hippocampal nerve cells in the hippocampal structure in the brain, affecting the morphology of hippocampal dentate gyrus granular cells, affecting the brain hippocampus volume, promoting BDNF protein and mRNA expression, affecting hippocampal paralbumin expression and brain Internal neurotransmitter levels (Wu 2019). Through Chan Chuang exercise, the corresponding stimulation enables better expression of hippocampal mitochondrial genes in the brain, and further stimulates and enhances the activity of brain mitochondria, thereby improving the plasticity of brain nerves. Eventually, exercisers can obtain the development of hippocampal structure to a certain extent. The proliferation of hippocampal cells and the corresponding improvement in hippocampal structure can improve the body's cognitive function (Du, Wang 2019; Wu 2019).

Emotional Mechanism

Studies have shown that some forms of Chan Chuang (three-circle pile) can alleviate the "subliminal depression" of college students, including improving depression, anxiety and related symptoms (Guo 2018). The influence of exercise intervention on emotions is mainly reflected in two aspects, one is to inhibit the generation of negative emotions, and the other is to generate and maintain positive emotions. In the process of Chan Chuang, the brain is stimulated by less negative emotions and enhances its own anti-stimulation ability against those emotions. Yiquan stance effectively reduces the exercisers' negative emotions such as anxiety, tension, anger, fatigue and so on, significantly improves the positive emotions such as reaction, control, attention, and awareness, and enhances the brain's execution ability (Ma

2011; Guo 2018). Exercise intervention can improve the body's brain nerve remodeling function and the cognitive function of depression. At the same time, aerobic exercise can play a positive role in predicting emotions (Du, Mo 2019). During exercise intervention, the body secretes chemicals such as testosterone, norepinephrine, brain-derived neurotrophic factor, and adrenaline. Norepinephrine and epinephrine can improve the body's exercise level and make people feel pleasant in their subjective consciousness. Testosterone can produce positive emotions and the brain will secrete brain-derived neurofactors. The produced BNDF from it can promote the hippocampus in the brain to a certain extent, which can improve human cognition. During exercise, the human body will also increase the level of gamma-aminobutyric acid (CABA). The increase of CABA can have an anti-depressant effect and inhibit the generation of negative emotions (Du 2019).

The intervention time of Chan Chuang

According to the current research, there are no normative requirements for the dose in the Chan Chuang intervention research. The stance exercise dose is the description of the duration of the Chan Chuang intervention. Different stance doses have different effects on physical and mental health. Only a certain amount of intervention time can cause body stimulation. However, researches in China on Chan Chuang lack a detailed discussion in this field, and there is no clear division, which makes the control of dose in the intervention process inaccurate.

Table 4. Doses of Chan Chuang intervention

Intervene	Duration	Frequency/ Period
Liaoning Medical Journal，1960	10 minutes-1.5 hours	
Wang, 2017	7minutes-15minutes	7 times/week
Wen, 2016	15minutes-30minutes	One month
Guo, 2019	50minutes	5 times/week; 2 months
Yan, 2019	50minutes	5 times/week; 2 months
Chen, 2019	50minutes	5 times/week; 2months
Lv, 2019	30minutes	7 times/week; 1 month
Dai, 2019	60minutes	3 times/week; 2 months
Fang, 2014	Progressive 5minutes-60minutes	7 times/week; 3 months

According to the document "*Liaoning Medical Journal"*, the earliest stance intervention happened in 1957, and more than 1,600 treatments were carried out on nearly 400 people. The dose was applied according to individual differences, ranging from 10 minutes to 1.5 hours. The earliest literature also did not make clear descriptions of the intervention dose. Existing studies have shown that a certain dose of Chan Chuang intervention and acupuncture treatment can have a better therapeutic effect on patients with osteoarthritis (Hu 2019). Through a two-week intervention experiment, being given 7-15 minutes each exercise and 7 times a week, can have a significant positive effect on patients (Wang 2019). This kind of compound and specific dose intervention can be more effective than the single intervention in previous studies. A one-month compound intervention with traditional Chinese medicine Yiqi Anshen recipe three times a day and 5-10 minutes Chan Chuang exercise each time, can significantly improve sleep quality in people with sleep disorders (Wen 2016). In recent years, several related studies have shown that a considerable amount of literature has standardized the dose for intervention treatment and observation. The intervention process is divided into two parts: collective training and coaching exercises. The collective exercises are carried out for 2 weeks and 5 exercises per week. The practice time is 60 minutes, including teaching and learning. The coaching training lasts for 12 weeks, 5 times a week, and the practice time is shortened to 50 minutes (Guo 2019; Yan 2019; Chen 2019). Collective training is used to enable participants to master the basic technical movements of Chan Chuang. In the coaching exercise process, participants practice with the help of instructors to give full play to the specific stimulation of Chan Chuang to the body. In addition, a number of studies have adopted the method of increasing load to intervene on piles, and have achieved considerable results (Fang 2014; Gong 2020; Dai 2019).

Discussion

Insufficiency of Current Literature Research

In contrast to the previous research on Chang Chuang intervention, it can be found that the current Chan Chuang intervention research has many shortcomings. In many studies, the stance intervention duration is too short, which may lead to unclear results. For example, in the Chan Chuang intervention study conducted by scholars in Japan, the intervener conducted a two-month stance intervention, and the obtained experimental results were inaccurate and had larger deviations (Chen 2016). In addition, most studies only observe surface phenomena and lack in-depth exploration of related functional mechanisms, which makes the Chan Chuang lack of sufficient theoretical foundation.

Chan Chuang's Development Direction in Clinical Medicine

At present, Chan Chuang exercise has been used in clinical practice for more than sixty years. Its main application scope is to improve the function of the human body, as well as the guided combination of medicine and manual therapy. It can be clearly seen from the retrieval of related literature that early Chan Chuang intervention mainly focused on the effect of stance on nerves, hypertension and myoelectric changes. The general direction of modern stance intervention research points to human mental intervention and explores the effect of stance intervention on people's negative emotions and the ability of emotional control.

Suggestions

In order to better apply and promote Chan Chuang, (1) Exploring the benefits of Chan Chuang more comprehensively and revealing the relevant mechanisms behind the it to clarify the value of Chan Chuang more scientifically and systematically. (2) Expanding the sample size of the relevant Chan Chuang intervention tests to ensure the reliability and timeliness of the data. (3) Intervention time should be as long as six months or more. Long-term stance intervention may be easier to obtain significant tests results. (4) Increasing clinical research to develop the practicability of Chan Chuang in modern society.

References

Chen C.H.,Hung K.S.,Chung Y.C.,Yeh M.L. (2019). *Mind-body Interactive Qigong Improves Physical and Mental Aspects of Quality of Life in Inpatients with Stroke: A Randomized Control Study, European Journal of Cardiovascular Nursing* : Journal of the Working Group on Cardiovascular Nursing of the European Society of Cardiology,vol8,pp.18.

Chen J. (2016). *The Influence of the Chan Chuang of Sanyuan Guiding Station on the Physical Fitness of Middle-aged and Old People*, Joural of Sport,vol.05,pp.155-156+105；doi:CNKI:SUN:YDAA.0.2016-05-085.

Chuang T.Y.,Yeh M.L.,Chung Y.C. (2017). *A Nurse Facilitated Mind-Body Interactive Exercise (Chan-Chuang Qigong) Improves the Health Status of Non-Hodgkin Lymphoma Patients Receiving Chemotherapy: Randomised Controlled Trial,International*, Journal of Nursing Studies, vol.25,pp.69.

Dai A.Y. (2019). *Research on the Influence of Taijiquan Intervention on Selective Attention and Continuous Attention. Thesis,* Beijing Sport University, Beijing, China.

Fang C. (2014). *Study on the intervention of health pile on mild to moderate hypertension*,. Thesis, Beijing Sport University, Beijing, China.

Du Y.,Wang L.,Zhang X.L.,Liu B.G.,Dai J.,Wu H.L.,Hu H.Y.,Liu H.Y. (2019). *Control Study of Exercise′ influence on Depression′s Symptom，Cognitive Function and GABA*, Journal of Chinese General Practice,vol.17,no.09,pp.1547-1550;doi:10.16766/j.cnki.issn.1674-4152.000994.

Duan T.J. (2008). *Research on the Value and Role of Traditional Wushu's Zhuanggong*, Thesis, Henan University, Henan, China.

Guo Y. (2019). *The Physiological and Gene Expression Mechanisms of the "Heart-adjusting" Effect of the Three-Circle-Standing Power to Relieve Depression*, Thesis, Chinese Medicine University, China.

Guo S.J. (2019). *Effect of Health Qigong Ba Duan Jin on Cognitive Function and Negative Emotion of Patients with Brain Injury during Rehabilitation*,Chinese Society of Sports Science: Compilation of abstracts of the 11th National Sports Science Conference, Chinese Sports Science Society,pp.3817-3818.

Hu W.M.,Lu w.,Cai Y.J.,Liang Y.Q.,Ding Y.Y. (2019). *Clinical Study on Treatment of Senile Knee Osteoarthritis with Acupuncture and Sequential Station Stake Guidance Training*, Journal of Henan Traditional Chinese Medicine,vol.39,no.06,pp.927-931;doi:10.16367/j.issn.1003-5028.2019.06.0230.

Jiang L. (2009). *Research on Chan Chuang Promoting the Recovery of Basketball Players' Knee Joint Injury*, Thesis, Henan University, China.

Lee R.Y. (2014). *Advocating boxing with aspirations, wanting to go back to the*

beginning-inheriting Wang Xiangzhai's legacy professor, Journal of Fighting Martial Arts Science,vol.05,pp.33-36.

Lee T.I.,Chen H.H.,Yeh M.L. (2006). *Effects of Chan-Chuang Qigong on Improving Symptom and Psychological Distress in Chemotherapy Patients,* The American Journal of Chinese Medicine,34(1), pp. 37-46.

Liang C.J.,Zhang X.M. (2017). *Research on Breathing Regulation of Health Chan Chuang Qigong*, Joural of Chinese School Sports (Higher Education),vol.12,pp.80-86.

Liang Y.H.,Feng Y.H. (2019). *Studies on the Effects of Exercise Doses on Cardiovascular Health among the General Population*, Journal of Sports Science Literature Bulletin,vol.27,no.02,pp.19-22+54.

Liang Z.S. (2010). *Patients with hypertension can practice standing skills,* Journal of Cardiovascular Disease Prevention Knowledge,vol.02,pp.31 ; doi: CNKI:SUN:XXGF.0.2010-02-013.

Lin J.S. (2012). *Study on the Dose-effect Relationship of Exercise Intervention to Improve the Cardiopulmonary Endurance of 40-49-year-old Men*, Thesis, Beijing Sport University, Beijing, China.

Lin J.S. (2016). *Study on the improvement effect of different doses of exercise intervention on cardiac function*, Sports Physiology and Biochemistry Branch of Chinese Sports Science Association. The 4th (2016) National Conference on Exercise Physiology and Biochemistry-Compilation of Abstracts of Papers on Exercise, Physique and Health, Sports Physiology and Biochemistry Branch of Chinese Sports Science Society: Chinese Sports Science Society,pp.263.

Liu X.L. (1996). *A Preliminary Study on the Physiological Mechanism of Taiji Zhanzhuang*, Journal of Fujian Sports Technology,vol.04,pp.20-21+37;doi:CNKI:SUN:FUJI.0.1996-04-006.

Lv J.X. (2019). *Analyzing the "Heart Adjustment" Effect of Right-handed College Students' Standing Stake Exercises Based on the Alpha Band EEG Power*, Chinese Medical Qigong Society. Proceedings of the 6th Member Congress and Academic Annual Meeting of the Chinese Medical Qigong Society,Chinese Medical Qigong Society: Chinese Medical Qigong Society,vol.196-203.

Lu W.H.,Chen J. (2013). *Theory Study on the Fitness Effect of the Three — Circles Guidance Station Pile to the Old People*, Journal of Fujian Sports Technology,vol.32,no.01,pp.18-19+23;doi:CNKI:SUN:FUJI.0.2013-01-007.

Lv J.X. (2018). *Analysis of the effect of standing stance on the mental and physical balance of college students with unbalanced spine*, Thesis, Chinese Medicine University, Beijing, China.

Ma J.G. (2011). *Brain Mechanism Experimental Research on Zhanzhaung of Yiquan's Function of Improving Emotion and Executive Control(New Infrared Spectroscopy)*, Thesis, Capital University of Physical Education And Sports, Beijing, China.

Meng Q.W. (2017). T*he Impact of Different Zhan Zhuang Postures Beginners of Nei Jin Yi Zhi cChan on the Activity of Lower-limb Muscles*, Thesis, Soochow University, Suzhou, China.

Mo Y.Y. (2019). *Aerobic Exercise and Sleep Quality: the Mediating Role of Emotions*, Thesis, Guangxi University, Guangxi, China.

Qin Y.X. (1989). *Effective Ways to Improve the Confrontation Ability of Basketball Players-Chan Chuang*, Journal of Sports and Science,vol.05,pp.41-42 ； doi:CNKI:SUN:TYYK.0.1989-05-016.

Shan C.L.,Li J.A.,Zhou S.F.,Yuan X.L. (2003). *The Influence of Mind-entering Thoughts on EEG Topographic Map*, Chinese Journal of Rehabilitation Medicine,vol.10,pp.25-27；doi:CNKI:SUN:ZGKF.0.2003-10-011.

Tu P.,Liao Y.P. (2014). *Effect of Wuqinxi and Zhanzhuang on Knee Flexor and Extensor Strength and WOMAC Scores of Female Patients with KOA,* Journal of Chengdu Sport University,vol,40,no.06,pp.68-71+84；doi:10.15942/j.jcsu.2014.06.001.

Wang W.K.,Chen S.J. (2017). *Acupuncture Combined with Standing Stake Excerise in the Treatment of Early Stage Knee Osteoarthritis for 30 Cases*, Journal of Modern Distance Education of Chinese Medicine,vol.15,no.19,pp.123-125;doi:CNKI:SUN:ZZYY.0.2017-19-057.

Wen Y.J. (2016). *Observation on the Therapeutic Effect of Yiqi Anshen Decoction Combined with Chan Chuang in Treating Insomnia with Deficiency*, Thesis, Chinese Medicine University, Beijing, China.

Wu D.,Xiong K.Y.,Song Y. (2012). Electromyography Analysis of Santishi of Ying Yie, Journal of Beijing Sport University,vol.35,no.04,pp.65-69+73;doi:10.19582/j.cnki.11-3785/g8.2012.04.014.

Wu Y.G. (2019). *The Effect of Aerobic Exercise Intervention on the Cognitive Function of Hospitalized Patients with Depression*, Thesis, Northeast Normal University, Jilin, China.

Yang S.H.,Yang Q.F.,Shi J.M.,Cao Y. (1994). *Observation on the Changes of the EEG Spectrum of the Chan Chuang Practitioners*. Chinese Journal of Integrated Traditional Chinese and Western Medicine.vol.11,pp.643-646 ； doi:CNKI:SUN:ZZXJ.0.1994-11-000.

Yan J. (2016). *Progress in clinical research on station pile work in the past 40 years,Chinese Medical Qigong Society. Proceedings of the 2016 Academic Annual Meeting of the Chinese Medical Qigong Society,*pp.245-248.

Yan J. (2019). *Application of Heart Rate Variability to Analyze the Physiological Mechanism of Three-Circle Stance to Improve the Anxiety State of College Students*, Thesis, Chinese Medicine University, Beijing, China.

Yan J.,Qu X.H.,Wei Z.R.,Zhang J.L.,Wei Y.L. (2019). *Effects of Three-circle Pole-standing Qigong on Heart Rate Variability in College Students with Anxiety,* Journal of

Beijing University of Traditional Chinese Medicine,vol.42,no.07,pp.555-559；doi:CNKI:SUN:JZYB.0.2019-07-006.

Yeh M.L.,Chung Y.C. (2016). *A Randomized Controlled Trial of Qigong on Fatigue and Sleep Quality for Non-Hodgkin's Lymphoma Patients Undergoing Chemotherapy*,European Journal of Oncology Nursing, pp.23.

Zhao X.Y. (2015). Electromyography Analysis of Zheng's Santishi and Station Pile Against the Wall, Thesis, Chengdu Institute of Physical Education, Chengdu, China.

Zhang A.M.,Sun S.L.,Bao Q.Z.,Zhang J.Z. (2009). *Clinical Observation on the Treatment of Knee Joint Osteoarthritis by Combination of Low Standing Post and Manual Massage*, Journal of Hebei Traditional Chinese Medicine,vol.31,no.07,pp.994-995;doi:CNKI:SUN:HBZY.0.2009-07-026.

Zhang R.L.,Wang H.X.,Li Q.X. (1984). *The effect of Zhanzhuang on Blood Pressure, Cerebral Blood Flow Graph, Lower Limb Blood Flow Graph and Electrocardiogram*, Journal of Xinxiang Medical College,vol.01,pp.63-65+62;doi:CNKI:SUN:XXYX.0.1984-01-013.

Zhang S.H. (1988). *Preliminary Study on the Treatment of Lumbar Intervertebral Disc Herniation with Songjing Station Piling*, Chinese Journal of Primary Health Care,1988； doi:CNKI:SUN:ZGCW.0.1988-04-027.

Zhang X.J. (2018). Investigation on Depression, *Anxiety and Sleep Status of Undergraduates and Research on the Intervention Effect of Chan Chuang,* Thesis, Beijing University of Chinese Medicine, Beijing, China.

Zhang Z.G.,Zhao T.,Wu S.P.,Yang X.T. (2012). Clinical Study on the Prevention and Treatment of Lumbar Intervertebral Disc Herniation by Chiropractic with Chan Chuang Pillar, Journal of Chinese Medicine News,vol.27,no.07,pp.908-909; doi:10.16368/j.issn.1674-8999.2012.07.019.

Zheng R.X.,Wang Y.Z.,Zhou X.S.,Yeh M.L. (2018). *The effect of Zhan Zhuang Qigong on improving exercise endurance, depression and superior quality of patients with heart failure,* Journal of nursing Studise,pp.34-44.

Zhou P. (2015). *A Study on the Effectiveness of Chinese's Traditional Standing Exercise on University Student's Physique*, Thesis, Capital University of Physical Education, Beijing, China.

Zhou X.Z.,Zhang Z.X.,Cui H.J.,Zhang Y.,Li C.R.,*Study on the Change of Surface Electromyography Variation ofCore Muscles by Standing Qigong*, Journal of Liaoning University of Traditional Chinese Medicine,vol.20,no.11,pp.66-69;doi:10.13194/j.issn.1673-842x.2018.11.018.