

Treating Depression With Tai Chi: State Of The Marshal Art And Future Perspectives In Older Adults.

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Abstract

One of the most frequent mental illnesses in America is Major depressive disorder (MDD). Currently treatments are not satisfactory and there is a high non- response rates, high rates of relapse and unacceptable side-effects, current treatments are inadequate in elderly individuals. Participants between 60-80 year old were recruited and randomized into a Tai Chi Chauhan, yoga and Baduanjin. A growing body of research indicates that the popular mind-body practice Tai Chi, which has its root in martial arts, can dramatically regulate emotion and lessen the symptoms of mood disorders in elderly adults. Another research shows that the practicing Tai Chi can reduce the symptoms of anxiety and depression as well. It's believed that the slow, mindful breaths and movements have a positive effect on the nervous system and mood-regulating hormones. First look at little scientific research that was used Tai Chi as a depression treatment. Then, investigation done in numerous ways that Tai Chi may reduce depression symptoms, speculating that the practice may alter the activity and connection of the brain of elderly that control mood also modulate the autonomic nervous system, inhibits neuro-inflammatory sensitization and control hippocampus neurogenesis. Finally, some typical intervention problems and potential solutions. Specific goals of the study include creating a streamlined and customized Tai Chi protocol for depression clients, comparing Tai Chi to other mind-body practice like yoga and Baduanjin, and also creating a new mind- body practices that combine the benefits of various mind –body exercise in elderly.

Keywords: Tai Chi, mind–body intervention, major depressive disorder, depression, brain network

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I. Introduction

In the United states, major depressive disorder is a very common kind of mental disease ¹.The basic therapies for major depressive disorder are psychotherapy and psychopharmacology ².The therapeutic effectiveness of the treatment has been questioned, and treating the illness is associated with direct and indirect expenses³⁻⁵.Both personnel and clients must spend a lot of time on psychotherapy to improve the condition, and many suffer from unpleasant pharmaceutical side effects such as “Sexual dysfunction, weight gain, sleep disturbances”⁶.Many people only partially respond to antidepressants,and they may need to be supplemented with other medications to increase the medication’s limited effects⁷.Some academics have started investigating the efficacy of complementary medicines in light of the drawbacks of standard therapy. Studies show that physical exercise interventions are effective in maintaining or improving cognitive function in older adults⁸. However, for the elderly, with the increase of age and the decline of physical function, they often cannot bear and adhere to high-intensity sports training for a long time. Traditional Chinese mind–body exercises (TCEs), which consist of gentle movements, breathing techniques, and meditation⁹, are deeply loved by the elderly. National Fitness Guide issued by the State Sports General Administration of China in 2017 pointed out that TCEs, which include Tai Chi, Baduanjin, Qigong, Yijinjing, and Wuqinxu, are gentle and safe for older adults, with an emphasis on the combination of meditation and physical activities.

Recently, Tai Chi, a common mind-body intervention, has caught the interest of both the general population and researchers. Tai Chi is becoming more widely available to the general public. It may conduct without certified instructor. To bolster, integrate, and relax the body and mind, Tai Chi uses slow soft motions, breathing exercises, and cognitive skills such as concentration, imagery ¹⁰.It takes up very little physical space and may be practiced by persons of different ages and physical abilities. Many well- designed researches ¹¹ have backed up the advantages of Tai Chi for major depressive disorder. The fact that the Tai chi is safe and does not cause side effects sometimes linked with pharmaceuticals makes it good option for treating or assisting in the treatment of MDD

Tai Chi has a therapeutic impact, but it need to be further investigated because it is not entirely obvious how it works. Although there are various forms of Tai Chi, none of them have been have expressly designed to benefit people with depression. The difficulty of Tai Chi exercise further prevents its use in depressed clients. Therefore, it is essential to create a streamlined Tai Chi routine specifically designed for depression.

Specifically, recent studies reported that Tai Chi and qigong interventions have been shown to be effective in reducing depression and anxiety symptoms in a variety of adult populations, including healthy adults, adults with chronic physical illness, and adults with mental health outcomes.¹².

In this article, first provide a summary of the results from clinical studies on the use of Tai chi to treat depression.

Afterword, make an effort to condense the possible pathways by which the intervention all treat depression symptoms.

Finally, suggest a fresh approach to Tai Chi study as well as a new Tai Chi procedure based on these posited mechanisms.

Please take a look at a few recently released review studies on the advantages of Tai Chi for people with depression and mood disorders ^{8, 13}.

Potential of Tai Chi treatment of Depression- Results from clinical studies

Chou ¹⁴ looked at how Tai Chi affected the depressed symptoms of 14 older Chinese patients in a previous study. When compared to a waitlist control, researchers discovered that 3 months of Tai Chi instruction can significantly lower scores on the Center for Epidemiological Studies Depression Scale (CES-D) and all of its subscales, including those measuring somatic symptoms, negative affect, interpersonal relationships, and well-being. After adjusting for age, gender, and education, but not for changes in social support, as determined by the Lubben Social Network Scale (LSNS), these lower scores remained statistically significant. According to this research, social support may help explain how Tai Chi reduces depression symptoms. One of the early studies looking at Tai Chi's impact. The results of this early study, which looked at how Tai Chi might affect depression, were encouraging and noteworthy. However, it was constrained by the use of a passive control and a small sample size. Lavretsky et al. ¹⁵ conducted a follow-up trial to see whether adding 10 weeks of Tai Chi to an SSRI (escitalopram) therapy regimen would improve the treatment of depression in 73 older persons. They discovered that patients in the Tai Chi-supplemented condition were more likely to: 1) have greater improvements in depressive symptoms or experience depression remission; and 2) have greater improvements in C-reactive protein levels and the 36-Item Short Form Health Survey physical functioning and cognitive tests when compared to the control group. the oversight group. These results imply that adding Tai Chi to pharmacological treatment for elderly depression may result in higher clinical improvement. This study had a sizable sample size and got favourable results for both the subjective evaluations of the patients and the levels of inflammatory markers. It illustrates the advantages of incorporating Tai Chi into an antidepressant prescription but skips over specifically looking at how Tai Chi affects depression.

In 92 pregnant women who were prenatally sad, Field et al. ¹⁶ looked into the benefits of combining Tai Chi and yoga. When compared to a waiting control group, they discovered that women who practiced Tai Chi/yoga for 20 minutes each week for 12 weeks scored less depressed, less anxious, and less sleep deprived (Table 1). This study had a large sample size and offered crucial information on Tai Chi's

Table-1 Tai Chi studies applied on patients with depression and primary outcomes

Study	Patient population demographics/sample size	Setting	Treatment (n)/ control (n)	Treatment-related information	Primary outcome measures	Major results
Yeung et al. (10)	39 Chinese Americans with MDD, 77% women; mean (SD) age=55(10)	Group Tai Chi class in Boston, MA; taught in Chinese	Tai Chi: n = 26 Waitlist: n = 13	Tai Chi: 1-h class twice a week, 12 weeks Waitlist: 12 weeks	Depression severity following treatment, as measured by the HAM-D ₁₇	Response and remission rates were better in the Tai Chi group versus the waitlist group. However, these differences were not significant ($p = 0.15$ and $p = 0.30$ for response and remission rates, respectively). Tai Chi was proven safe and feasible for Chinese Americans

Chou (14)	14 Chinese patients with MDD, ages 60 and older	Classes led by Tai Chi instructor in group setting	Tai Chi: $n = 7$ Waitlist $n = 7$	Tai Chi: 3 × 45 min/week, 12 weeks Waitlist: 12 weeks	Depression severity following treatment, as measured by the CES-D	Tai Chi can yield a reduction in depressive symptoms compared to a waitlist control (main effect of group assignment: 0.82, $p < 0.01$). Controlling for social support between groups removes any benefit of Tai Chi on CES-D scores. Thus, social support may contribute to the effects of Tai Chi on depressive symptoms.
Lavretsky et al. (15)	73 adults over 60 with MDD; Escitalopram with Tai Chi group: 64% women, mean (SD) age = 69.1 (7.0); Escitalopram with health education (HE) group: 60% women, mean (SD) age = 72.0 (7.4)	Both Tai Chi and HE classes were conducted by study staff. Tai Chi classes included a warm up and cool down. HE classes included lectures and discussion.	Escitalopram with Tai Chi: $n = 36$ v HE: $n = 37$	Escitalopram with Tai Chi: 2 h/week, 10 weeks Escitalopram with HE: 2 h/week, 10 weeks	Depression severity following treatment, as measured by the HAM-D ₂₄ ; subjects were classified as “remission,” “response”, and “nonresponse” according to score	A higher percentage of participants achieving remission and response was observed in the escitalopram with Tai Chi group than in the escitalopram with HE group ($p < 0.05$). Compared to HE, Tai Chi may better augment the effects of SSRI medication in the treatment of major depression.
Field et al. (16)	92 pregnant women with MDD; mean (SD) age = 26.6 (5.5); range = 18–37	Participants recruited from medical clinic; classes taught in group setting	Tai Chi with Yoga: $n = 46$ Waitlist: $n = 46$	Tai Chi with yoga: 20 min/ week, 12 weeks Waitlist: 12 weeks (received Tai Chi/yoga intervention after initial 12 weeks)	Depression severity following treatment, as measured by the CES-D	Tai Chi with yoga intervention yielded a greater reduction in depressive symptoms than the waitlist control ($p = 0.001$).
Yeung et al. (11)	67 Chinese Americans with MDD; ages 18 to 70	Group Tai Chi class in Boston, MA; taught in Chinese (Cantonese, Mandarin)	Tai Chi with yoga: $n = 23$ Waitlist: $n = 22$ Healthy education: $n = 22$	Tai Chi: 1-h class twice a week, 12 weeks Waitlist: 12 weeks Healthy education: 1-h class twice a week, 12 weeks	Response and remission rates following treatment, as measured by HDRS ₁₇	Tai Chi intervention yielded greater response and remission rates than the waitlist group (odds ratio for response = 2.11, 95% CI; odds ratio for remission = 3.01, 95% CI). Tai Chi intervention yielded a

						significantly greater response rate (odds ratio = 8.90, 95% CI) but an insignificantly greater remission rate (odds ratio = 4.40, 95% CI) compared to HE group.
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MDD major depressive disorder; HE health education CES-D, Centre for Epidemiological Studies – Depression Scale; HAM-D₁₇, Hamilton Rating Scale for Depression (17 items); HAM-D₂₄, Hamilton Rating Scale for Depression (24 item); CI, Confidence Interval.

benefits on depressive pregnant women, who often would not seek out pharmacological treatment. A waitlist is regarded as a weak control, and mixing Tai Chi and yoga is unusual in the real world.

Yeung and colleagues, in another study, looked at the efficacy and results of using Tai Chi to treat depressive symptoms in 39 Chinese Americans with MDD. They discovered that the Tai Chi group's patients (73% of them) finished the intervention without experiencing any negative effects. The purpose of this proof-of-concept study, which had a limited sample size, was to examine the viability and safety of Tai Chi for depressed Chinese Americans, a group that frequently avoids traditional mental health services because of the stigma associated with mental illness. In a subsequent investigation with a bigger sample size (n = 67), According to researchers, after a 12-week intervention, "response rates were 25%, 21%, and 56%, and remission rates were 10%, 21%, and 50% for the waitlisted, education, and Tai Chi intervention groups, respectively." Participants who were randomly assigned to the Tai Chi group responded to the treatment more favorably than those who were assigned to the waitlist and education groups. In addition, those who took part in the Tai Chi program saw a markedly higher rate of remission than those on the waiting list, as well as "a trend of improved remission compared to the education group" (Table 1).

Using both passive and active control groups, this study offered preliminary proof of Tai Chi's usefulness in treating depressed Chinese Americans. Improvements in the response rate and remission rate exhibited statistical significance when the Tai Chi group was compared to the passive control group. However, when the Tai Chi group was contrasted with the active control group, the improvement in responder rate demonstrated statistical significance, but not for the improvement in remission rate. This discouraging conclusion might be explained by the very small sample sizes in each of the study groups. To get a more firm conclusion, studies with bigger sample numbers will be required. Elderly person are also prone to depression, and numerous research have looked at depression treatment specifically for this demographic^{17, 18}. For example, Brown et al. ¹⁹ examined the psychological effects of 16 weeks of Tai Chi ,low intensity walking (LW), and moderateintensity walking (MW) on healthy, inactive people.It was discovered that ladies practicing Tai Ch i had less mood disturbances, including stress, melancholy, rage, disorientation, and overall mood disruption an improvement in mood overall. Men in the same group as the women showed higher positive affect, while women randomly assigned to the (MW) group also reported higher satisfaction with physical features. The usefulness of Tai Chi in boosting mental health is demonstrated by these results, which imply that mind- body therapies like Tai Chi may have greater psychological effects than activities lacking a cognitive component. As the people with fibromyalgia ^{20, 21}, arthritis ^{22, 24}, multiple sclerosis ²⁵, heart failure ²⁶⁻²⁸, mild dementia ²⁹ and cardiovascular illness ³⁰, there is finally mounting evidence that Tai Chi helps to alleviate depressive symptoms.

Mechanisms of Tai Chi Treatmentof Depression

Tai Chi can alter the brain networks and regions linked to depression. Research has demonstrated a connection between structural and functional abnormalities in the brain areas related to emotion processing, self-representation, reward and interaction with external stimuli (stress and distress) and depression ³¹. The hippocampus, amygdala , anterior cingulate, ventromedial prefrontal cortex and dorsomedial prefrontal cortex are a few of these brain areas. Additionally, research points to the possibility that key elements of mind-body practices like Tai Chi may involve attention control, self-awareness and emotion control³². Although no direct research on the modulation impact of Tai Chi in patients with depression have been conducted, investigations on healthy volunteers and other patient populations have supported the possibility of such pathways. Furthermore, the outcomes of intervention studies confirm that different therapies can in fact change the target brain regions described in this paper in depressed individuals (Figure 1).

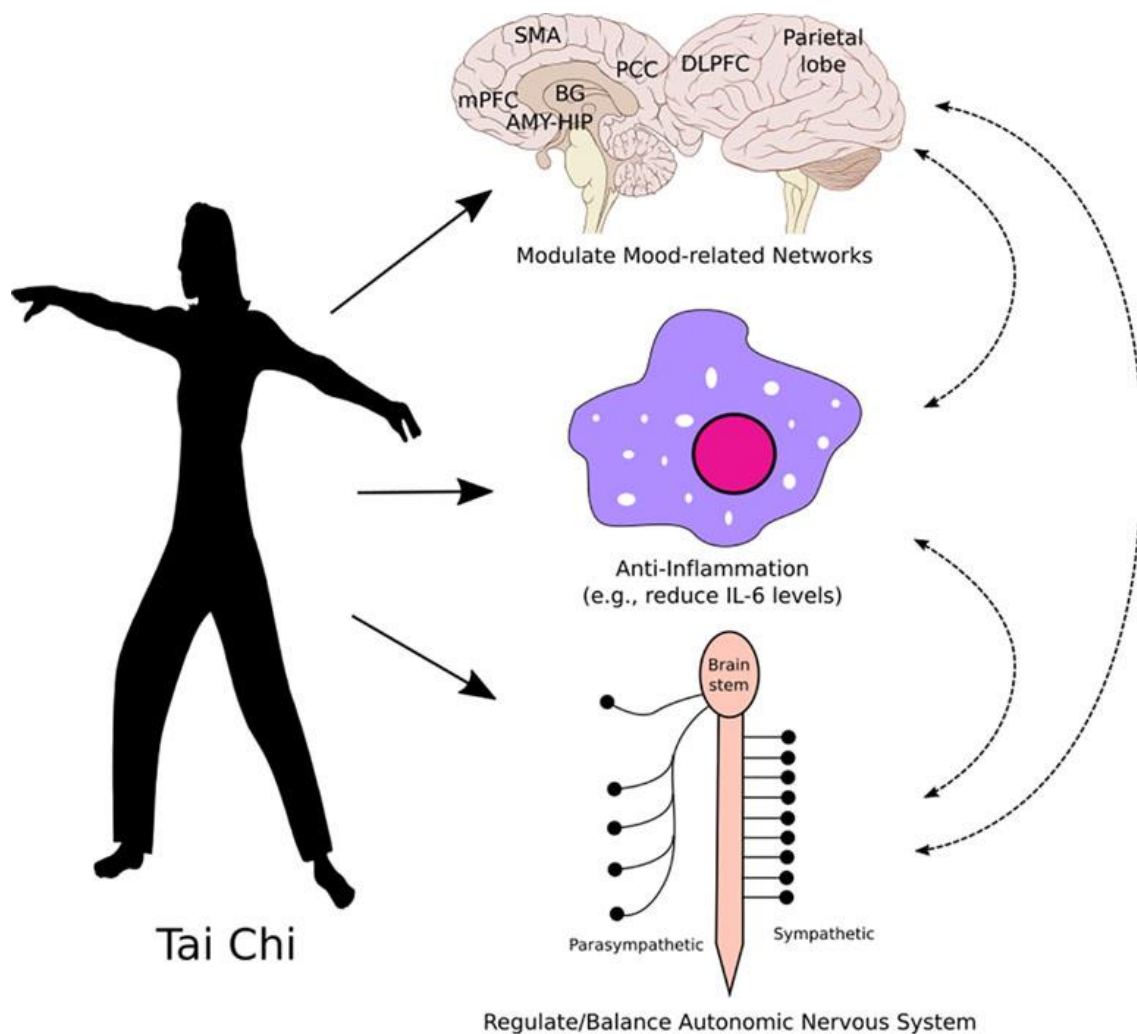


Figure: 1 Hypothesized mechanisms of Tai Chi Treatment of depression

For example, Gudayol-Ferre et al.'s systematic review points out that "antidepressive treatment is capable of normalizing brain activations in depressed patients during affective tasks in areas such as the DLPFC," and that therapies for depression are connected to changes in the default mode network (DMN). The cognitive control network may play a role in one possible mechanism of Tai Chi's effects on major depressive disorders.

Tai chi shifts attention away from the stressor and places it on breathing control, body posture, and movement. As a result, regular Tai Chi practice (mindful movement) can alter the attentional control network and lessen depression symptoms. Noradrenaline may also play a significant role in attention regulation. In accordance with the theory, we discovered that Tai Chi can significantly alter the resting state functional connectivity between the medial prefrontal cortex and anterior cingulate cortex and the dorsolateral prefrontal cortex, a crucial part of the cognitive control network. Major limbic and DMN areas in healthy aged person's³³ and fibromyalgia patients³⁴. Wei et al. discovered in a different study that Tai chi may reduce the fractional amplitude of low-frequency fluctuations (fALFF) in the bilateral frontoparietal network (executive/attentional control network). The frontoparietal network's fALFF and cognitive control abilities were also linked by researchers³⁵. In a more recent study³⁶, researchers discovered that, in comparison to the control group, Tai Chi can drastically reduce the functional connection between the DLPFC and the thalamus, ventral striatum, and right middle frontal gyrus. The DMN, a brain network involved in self-referential processing, emotional cognition, and emotion regulation may also be modulated by Tai Chi, according to studies.

For instance, findings from a prior study showed a substantial correlation between mind-body practice experience and fALFF in the DMN and a significant decrease in fALFF in the Tai Chi condition compared to a control.

As was already indicated, we discovered that Tai Chi can alter the functional connectivity between the cognitive control network and important areas of the DMN (MPFC/ACC), suggesting that it can alter how the two network

ks interact. Disruption of the DMN is one of the most trustworthy brain-imaging results on MDD³⁷. As a result, Tai Chi may also reduce depression symptoms by DMN modulation.

Additionally, research has demonstrated that Tai Chi can considerably alter the insula, putamen, and medial temporal pole, as well as other brain regions associated with mood regulation.

Together, the aforementioned studies imply that the modulation impact of Tai Chi may be significantly influenced by the central nervous system.

Tai Chi may alleviate depressive symptoms by lowering stress levels and controlling the inflammatory response

The brain and body react to demands by producing stress. Inflammation may have a role in the cognitive, emotional, and physiologic processes that stress, especially long-term stress may trigger raising the risk of developing depression³⁸. The emergence of typical depressive symptoms, such as low mood, anhedonia, exhaustion, psychomotor slowness, and social behaviour disengagement, might be brought on by stress-provoked neuro-inflammatory sensitization in particular. This procedure might involve the ACC, anterior insula and hypothalamus.

According to recent research, mind-body practice like Tai Chi may lower stress and control the inflammatory process³⁹ (Figure 1). For instance, Tai Chi has been shown by Jin⁴⁰ to increase heart rate, increase noradrenaline excretion in urine, and decrease salivary cortisol levels. The individuals felt more energized and reported less stress, despair, anger, exhaustion, and disorientation when compared to baseline levels. When the older adults with elevated levels of interleukin 6 (IL-6) at entry were subjected to Tai Chi Irwin and Olmstead observed that Tai Chi produced a reduction in IL-6 levels comparable to those found in Tai Chi and HE subgroups who had low levels of IL-6 at entry. Meanwhile, at entry were subjected to Tai Chi, Irwin and Olmstead⁴¹ observed that Tai Chi produced a reduction in IL-6 levels comparable to those found in Tai Chi and HE subgroups who had low levels of IL-6 at entry. Meanwhile, in comparison to Tai Chi and HE subgroups with low entrance levels of IL-6, IL-6 in HE subgroups remained higher. Decreases in IL-6 were associated with reduction in depressive symptoms in the two therapy groups. Last but not the least, Tai Chi is a mild to moderate form of exercise, and numerous research have shown that even light exercise can influence the immunological and inflammatory systems. These results support Tai Chi's ability to lower stress and produce anti-inflammatory effects.

Other Potential Mechanisms

The parasympathetic nervous system's reduced activity may be related to MDD, according to earlier research⁴². A non-invasive metric for tracking the dynamic balance between sympathetic and parasympathetic nervous system activity is heart rate variability (HRV). According to studies, the high-frequency (HF)-HRV component is a sign of treatment efficacy and has an inverse relationship with the degree of depression.

According to Lu and Kuo's research⁴³, Tai Chi can result in increased vagal modulation and tip the sympathovagal balance in the direction of lessened sympathetic modulation in elderly people. When Audette and colleagues compared the effects of a condensed Tai Chi routine to a brisk walking training program on parameters including aerobic capacity, HRV, and strength in older inactive women, they discovered that the Tai Chi group saw a considerable increase in estimated Vo₂ max. The mean within person change of HF power in normalized units rose only in the Tai Chi group indicating enhanced parasympathetic activation. Low frequency (LF) power in normalized unit also reduced at this time, indicating a reduction in sympathetic activity.

Researchers⁴⁴ discovered that Tai Chi and yoga combined showed statistically positive benefits on HRV metrics (normalized LF, normalized HF, and LF to HF ratio) and stress level in a recent meta-analysis of 17 randomized controlled trials. These findings imply that the modulating effects of Tai Chi on depression symptoms may possibly involve the nerve system (Figure 1). According to the neurogenic theory, adult hippocampal neurogenesis is diminished in depression and can be restored to bring about recovery. The medial prefrontal cortex, a crucial part of DMN, and the hippocampus's grey matter volume have both been demonstrated to be considerably modulated by Tai Chi and rsFC of the hippocampus. According to these results, Tai Chi may modify hippocampus neurogenesis to lessen depression symptoms. Figure 1 illustrates the numerous ways that Tai Chi may reduce depression symptoms.

Challenges and Future Directions:

Simplification of Tai Chi Protocol

The use of Tai Chi as a healthcare intervention has been severely constrained by the complexity of some of its motions. Additionally not all aspects of Tai Chi are important for maintaining good health and regulating mood. Therefore it is imperative to create streamlined Tai Chi protocols. In China, where Tai Chi originated, there has recently been a move towards simplification. The eight style Tai Chi, which is

regarded as a component of the Chinese martial arts system, is one example of such simplification. Tai chi in the eight styles has a total 10 postures. Including the opening, closing and eight main Yang-style Tai Chi movements. The 12-week Tai Chi program created by Dr. Peter Wayne is an effort to simplify Tai Chi in the West. Several classic Tai Chi warm-up activities, which might span 15 to 30 minutes, are introduced in the first portion. The second segment, which is based on the Cheng Ma Ching Yang-style short form, concentrates on five fundamental Tai Chi moves. Over the course of the 12 weeks, participants gradually increase the number of these motions. Simple cool-down exercises last for 5 minutes to round up the program. The entire workout lasts between 45 and 60 minutes. The Simplified Tai Chi protocols make it simple for beginners to practice Tai Chi at home or in the class simply copying the instructor's motions. It is important to note that even while these streamlined techniques seem encouraging, it is still unclear how they differ from classic Tai Chi. To compare the health benefits of traditional Tai Chi with simplified Tai Chi, comparative studies are required.

How Tai Chi Differs From Other Mind–Body Exercises:

Mind–body exercise encompasses a family of complex practices such as Tai Chi, yoga, and Baduanjin, each with different characteristics and foci. Although the exact mechanisms of these interventions are still under investigation, studies have found that the underlying mechanisms of different mindfulness movements may not be identical. In earlier research, we contrasted the modulating effects of Baduanjin, another mind-body with Tai Chi. When accompanied by video or audio at home, Baduanjin can be easily practiced by older adults, especially for those with cognitive loss, as it is considerably simpler than other mind-body exercise and only requires eight postures. Therefore, it discovered that, in healthy older individuals, Baduanjin can cause higher and more significant improvements in Wechsler Memory scale (WMS) sub score and grey matter brain volume alternations than Tai Chi.

In a different study⁴⁵, researcher contrasted the modulation impact of Baduanjin and Tai Chi on the DMN and found that Baduanjin lowered rsFC between the mPFC and orbital prefrontal gyrus/putamen while Tai Chi raised rsFC between the posterior cingulate cortex and right putamen/caudate when compared to control group. When the two mind-body therapies were directly compared, Tai Chi significantly enhance the rsFC between the right putamen/ caudate and the mPFC compared to Baduanjin, indicating that these two interventions may be linked to various mechanisms and therapeutic benefits.

Developing a Tailored Tai Chi Protocol for Different Disorders:

The development of a specific Tai Chi regimen for various disease and people may be significant path for Tai Chi research. Developing a Tai Chi program specifically for a certain group may greatly increase the positive impact of the practice and lessen any potential negative effects. Dr. Albert Yeung, a researcher and practitioner of Tai Chi made one such attempt and created the Tai Chi for mood program exclusively for those with mood problems.

The Tai Chi M routine includes 12 distinct Tai Chi movements, as well as mental concentration and deep rhythmic breathing. Tai Chi does not the difficult transitions between Tai Chi motions, which could lead to a greater intervention and simpler learning. Tai Chi M is distinctive in that it places less emphasis on building physical strength and more emphasis on contemplative movements, relaxation and timed breathing. It is best option for those with MDD and other mood disorders because of these qualities. Tailor made protocols may improve the advancement of Tai Chi; however this field of study also need more robust RCTs. The studies compiled in this publication show that Tai Chi is effective in reducing depression symptoms. But further research can be done with larger sample size.

Furthermore, the majority of recent studies have focused on Asian people, necessitating the need for further research on other ethnicities. Finally, future research should examine the differences between traditional Tai Chi and simplified low-intensity Tai Chi to identify the most crucial components of this promising mind–body intervention.

For instance, it would be worthwhile to look at whether conventional Tai Chi components may be eliminated without compromising the practices effectiveness. Researcher think the findings will Tai Chi become more widely accepted and less expensive, making it a more practical and affordable depression therapy option than medications and other approaches. And also think that global dearth of qualified Tai Chi instructors and mental health professionals might be addressed through Tai Chi M. Additionally, it might lessen inequities in mental health care among populations of people of colour who typically avoid traditional psychiatric care because of stigma associated with mental illness.

II. Conclusion

In conclusion, although Tai Chi has shown promise in regulating mood and easing depression symptoms, further research is needed to understand how it actually works. Tai chi is a promising low-intensity mind-body therapy. Tai Chi interventions may be well tolerated and cost effective intervention for depression.

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