

TOP TAI CHI STUDIES

A Research Summary of the
Health Benefits of Tai Chi

Introduction

Research into the health benefits of Tai Chi has taken off in recent years. Many articles about these benefits have been published in top medical journals and have come from researchers at leading medical institutions such as Harvard and Johns Hopkins University.

These are high quality studies based on sound science, not casual observations or anecdotes, and are well respected in the medical community. As more and more studies confirm the health benefits of Tai Chi practice, the reputation of Tai Chi in the medical community is rapidly increasing.

While 30 years ago few physicians even knew what Tai Chi was, many now recommend Tai Chi to their patients. Tai Chi is already practiced by more than two million people in the U.S., and this number is increasing.

Top Research Studies on the Health Benefits of Tai Chi

The following are 10 important studies of the health benefits of Tai Chi. The references to each summary are listed at the end of this article.

1. FALL PREVENTION

*Reducing frailty and falls in older persons: an investigation of Tai Chi and computerized balance training.*¹

This study was one of the first to document how Tai Chi practice can reduce the risk of falls among seniors. In the study, researchers were able to show that the risk of falling was much lower among seniors assigned to practice Tai Chi compared to other interventions. Since this study, dozens of others have confirmed these results and established Tai Chi's reputation as an excellent exercise for fall prevention.

Falls among seniors is a major health problem. More than two million seniors are treated in emergency rooms for falls each year, of whom over half a million require hospitalization. Falls are a leading cause of loss of independence among elderly adults and are projected to cost more than fifty billion dollars per year by 2020.

Tai Chi has not only been found to be one of the most effective ways to prevent falls, it was also shown to be the most cost-effective in a recent study comparing costs.² Widespread utilization of Tai Chi for fall prevention could easily save billions of dollars in medical costs each year. At a time when Medicare and Medicaid budgets are under strain, providing seniors access to high quality Tai Chi classes should be treated with urgency.

There are several factors that make Tai Chi especially effective exercise for preventing falls. First of all, it is a movement exercise involving deliberate weight shifts. This develops both balance and proprioception. Another important factor is that Tai Chi is

practiced in a slow deliberate manner which allows most seniors to practice it even if they have a hard time with many other exercises.

2. IMMUNE SYSTEM

*Effects of a behavioral intervention, Tai Chi, on varicella-zoster virus specific immunity and health functioning in older adults.*³

This study showed that Tai Chi has a beneficial effect on the immune system. It showed for the first time that a behavioral intervention, Tai Chi, could influence virus specific immune responses. The study measured cell-mediated immunity to the Herpes zoster virus which causes shingles using laboratory tests.

In a follow up study immunity to the chickenpox virus (varicella) was found to be significantly enhanced in a group assigned at random to practice Tai Chi compared to a group that did not receive Tai Chi instruction. After several months both groups received a vaccine.

The effect of Tai Chi on immunity was very pronounced with immunity increased by 50% over baseline in the Tai Chi group before they got the vaccine compared with a 75% increase for the control group which received the vaccine alone. Not only did Tai Chi provide impressive results by itself, it increased the response to the vaccine, with those who received the vaccine and practiced Tai Chi having better immune results than those who only got the vaccine.⁴

It is likely that improvements in the functioning of the immune system seen in these specific viruses would translate into improved resistance to other diseases as well. A healthy immune system could play a role in preventing a range of health problems.

3. HEALTHY AGING

*Comparing the health status of U.S. Taijiquan and Qigong practitioners to a national survey sample across ages.*⁵

This study compared the health status of long term Tai Chi practitioners to a nationally representative sample of individuals using data from the Centers of Disease Control and Prevention. Individuals were grouped according to age and exercise type: no exercise; some exercise; or Tai Chi or Qigong exercise.

It was found that, after controlling for the effects of income and education, individuals who practiced Tai Chi or Qigong had better health status as they aged than other Americans, even those who did other forms of exercise. For younger practitioners, the difference in health status between the three groups was not great, but as age increased the differences became more and more pronounced.

This study suggests that Tai Chi is an especially beneficial exercise for maintaining health as one ages. It supports the common view in China, and among people who practice Tai Chi, that Tai Chi helps to maintain health and vitality throughout one's life.

4. SLEEP

*Tai Chi and self-rated quality of sleep and daytime sleepiness in older adults: a randomized controlled trial.*⁶

This study showed that Tai Chi can lead to significant improvements in the quality of sleep and reduce daytime sleepiness. In the study, more than 100 seniors were randomly assigned to take Tai Chi or an alternative low-impact exercises program for 6 months. At the end of the study individuals in the Tai Chi group slept better and longer than those in the low-impact exercise group.

Other studies have confirmed these results both among seniors and younger adults. For instance, a study of college students found that those who enrolled in a semester-long Tai Chi class had less stress and better mood and sleep than those who enrolled in an alternative recreation class.

Sleep disorders are very common with a quarter of the U.S. population occasionally not getting enough sleep and nearly 10% experiencing chronic insomnia. The health consequences of poor sleep can be significant. Not only is it associated with many chronic diseases such as diabetes, cardiovascular disease, obesity and depression, it can also lead to car crashes and other accidents.

A number of studies have documented the benefits of Tai Chi for people with many of the chronic diseases that are exacerbated by lack of sleep. The observation that Tai Chi can improve the quality and duration of sleep provides an important reason that Tai Chi can help reduce the incidence and /or symptoms of many diseases and injuries.

5. BONE HEALTH

*The effects of Tai Chi on bone mineral density in postmenopausal women: a systematic review.*⁷

Research suggests that Tai Chi has a beneficial effect on bone health. Studies indicate that Tai Chi may be effective at slowing bone loss in postmenopausal women. One study that compared Tai Chi to resistance training, found that while individuals assigned to both groups showed increased signs of bone formation, in the resistance training but not in the Tai Chi group bone reabsorption also increased, indicating that Tai Chi may have a greater overall effect on net bone formation than resistance training.⁸

Another study that compared Tai Chi and resistance training found that both reduced hip bone mineral density loss in senior women after 12 months of exercising.⁹ Studies have also shown that long term Tai Chi practitioners have increased lower limb strength.¹⁰ Other studies, including one involving postmenopausal women,¹¹ have shown that Tai Chi practice leads to increased muscle strength while lowering weight.

6. PARKINSON'S DISEASE

Parkinson's disease is the second most common neurodegenerative disorder after Alzheimer's disease affecting about one million people in the United States. Symptoms of Parkinson's disease include tremors, slowness of movement, stiffness and problems with balance and falls. Falls among individuals with Parkinson's disease can lead to serious injuries and loss of independence. Because Tai Chi has been shown to reduce falls among the elderly, it is especially promising for individuals with Parkinson's. Furthermore, Tai Chi may help address several other symptoms of Parkinson's including depression, anxiety and sleep disturbances.

In a study published in the *New England Journal of Medicine* researchers presented the results of a study of 195 individuals with mild to moderate Parkinson's disease that compared Tai Chi to resistance training and to a stretching control group. The primary objective was to measure balance and postural stability. The study also looked at a number of secondary measures including gait and strength, functional reach, number of falls and motor scores on the Unified Parkinson's Disease Rating Scale.

Participants in the study were randomly assigned to one of the three groups, each of which participated in training two hours a week for twenty-four weeks. There was a high rate of participation among all three groups and the analysis was carried out including all participants who were randomized to one of the three groups to avoid bias that could arise by comparing only those who stuck with the exercises. The study compared the results at baseline to the results after three and six months as well as three months after the end of the classes. The study found that the Tai Chi group performed consistently better than the resistance-training and stretching groups in measures of postural stability. The Tai Chi group's scores in maximum excursion improved by 12.5% over baseline in the three-month follow-up compared to a 3% gain in the resistance-training group and a decline in the stretching group. Direction control was improved by about 9% in the Tai Chi group compared with declines in both the resistance-training and stretching groups. In both of the primary measures, improvements over baseline in the Tai Chi group was greater than in the other groups and the difference in improvements between the groups was statistically significant.

During the six-month study period, 62 falls were observed in the Tai Chi group compared to 133 in the resistance group and 186 in the stretching group, each of which had 65 members. The difference in the rate of falls was statistically significant between the Tai Chi and stretching group, and almost statistically significant between the Tai Chi and resistance group.

The Tai Chi group outperformed the stretching group in all secondary outcomes and the resistance group in stride length and functional reach. Improvements in gait speed and stride length suggest that Tai Chi may be effective in alleviating the slow movements (bradykinesia) associated with Parkinson's disease.

Both the Tai Chi and the resistance groups had a statistically significant reduction in the motor examination portion of the Unified Parkinson's Disease Rating Scale.

This study shows that Tai Chi reduces balance impairments in patients with mild-to-moderate Parkinson's disease, with additional benefits of improved functional capacity and reduced falls. It strongly suggests that Tai Chi is a valuable and appropriate exercise for individuals with Parkinson's disease.

7. DEPRESSION

*Complementary Use of Tai Chi Chih Augments Escitalopram Treatment of Geriatric Depression: A Randomized Controlled Trial.*¹³

Nearly two-thirds of seniors treated for depression fail to achieve remission with pharmaceutical treatment. Researchers at the University of California Los Angeles carried out a study to see if Tai Chi could help achieve improved results when used as a complimentary treatment in conjunction with an antidepressant medication.

The study involved seniors with major depression. Those who were randomly assigned to take Tai Chi classes in addition to medication (escitalopram) showed greater reductions in symptoms of depression than those in the control group who only received medication. In addition to improvements in symptoms of depression, the people in the Tai Chi group had improved physical function and scored better on cognitive tests after 10 weeks compared to the control group.

This study supports the view that Tai Chi can help seniors with depression achieve improved outcomes related to depression. While this study focused on seniors with major depression who were on anti-depressant medication, other studies support the use of Tai Chi for milder depression as well.

Depression and risk of falls are problems that exacerbate each other. Fear of falling, which is more common among depressed people, can actually lead to more falls. On the other hand treating depression in seniors can be complicated by the fact that antidepressants can increase the risk of falls. Because of this Dr. Alastair Flint of the University of Toronto states that “Based on the current state of knowledge, exercise, particularly Tai Chi, and cognitive-behavioral therapy should be considered the first line of treatment of mild depression in older fallers.”¹⁴ Since Tai Chi can improve the results obtained from antidepressants while helping to mitigate the risk of falls, Tai Chi is an excellent choice for seniors with depression.

While Tai Chi is great for senior with depression, other studies have also found important psychological benefits among Tai Chi practitioners of all ages ranging from college students to seniors.

8. KNEE OSTEOARTHRITIS

*Tai Chi is effective in treating knee osteoarthritis: a randomized controlled trial.*¹⁵

Osteoarthritis is the most common form of arthritis. It is characterized by the degeneration of cartilage and bone within a joint which eventually leads to pain and

stiffness. There is currently no cure for osteoarthritis, with treatments focusing on relieving symptoms and improving physical functioning. The most common form of symptomatic osteoarthritis is of the knee, with knee osteoarthritis affecting 16% of adults aged 45 plus. Osteoarthritis of the knee is one of the five leading causes of disability.¹⁶

In a recent study, researchers from the department of rheumatology at Tufts Medical Center in Boston randomly assigned 40 patients with knee osteoarthritis to 12 weeks of Tai Chi or to a control group in order to evaluate the effectiveness of Tai Chi for knee osteoarthritis. The authors note that while recommended core treatments for knee osteoarthritis include physical therapy such as aerobic and muscle-strengthening exercises, these have modest benefits for pain and physical function and may not affect psychological outcomes. They suggest that Tai Chi may be especially beneficial because its mental component could address chronic pain through improved psychological well-being while its physical components are consistent with current recommendations for exercise for osteoarthritis.

After 12 weeks of Tai Chi instruction, the Tai Chi group showed impressive improvements, with reduced pain and stiffness as well as improved physical function and performance. The Tai Chi group also showed psychological improvements with less depression and more self-efficacy. In follow-up evaluations after 24 and 48 weeks, the Tai Chi group continued to show greater improvements than the control group. For participants who continued to practice Tai Chi beyond the initial 12 weeks, the significant benefits for depression and self-efficacy appeared to be durable.

The authors noted that while recent pharmaceutical and rehabilitation trials have found minimal clinically important differences in pain and physical function, in this study the Tai Chi group had a 75% improvement in pain and a 72% improvement in function over baseline, a more than minimally perceptible improvement for patients.

While this trial focused on osteoarthritis of the knee, other studies have shown benefits for other types of arthritis including osteoarthritis of the hip,¹⁷ rheumatoid arthritis,¹⁸ fibromyalgia and ankylosing spondylitis.¹⁹

9. FIBROMYALGIA

*A randomized controlled trial of 8-form Tai Chi improve symptoms and functional mobility in fibromyalgia patients.*²⁰

Fibromyalgia is a common disease affecting about 2% of the population, with women being affected more often than men. Individuals with fibromyalgia have long-term widespread pain, especially in joints, muscles and other soft tissues. Many also suffer from fatigue, sleep disturbances and depression.

In a study of 101 patients with fibromyalgia, researchers found that Tai Chi reduced pain and improved sleep quality, mobility and balance compared to a control group. The improvements seen were impressive, with results both clinically and statistically significant. For instance, the Tai Chi group had a reduced score of 16 on the Fibromyalgia Impact Questionnaire, which is used by the American College of Rheumatology to measure the severity of fibromyalgia. This is impressive as the scores range from 0 to 80 with typical scores for patients with fibromyalgia ranging from 40 to 60. Furthermore, these results were achieved after only 36 hours of Tai Chi classes over 12 weeks. Since Tai Chi is a practice that can take years to learn well, it is likely that further improvements could be achieved over time.

This study shows that Tai Chi could provide significant benefits for people suffering from fibromyalgia.

10. PSYCHOLOGICAL WELL-BEING

*Tai Chi psychological well-being: systematic review and meta-analysis.*²¹

In any given year, one quarter of adults in the United States are diagnosed for one or more mental disorders. Many psychological conditions such as stress, anxiety, depression and mood disturbances are associated with chronic health problems. Mental

health problems are a leading cause of disability and cost more than fifty billion dollars in direct health care costs and billions more in lost income and productivity.

Evidence has been building that physical fitness has a positive effect on psychological health. There is an urgent need for inexpensive and effective strategies to promote psychological well-being and to improve general health. In a recent study, researchers from Tufts Medical Center in Boston compiled and analyzed high quality studies on the impact of Tai Chi on stress, anxiety, depression, mood and self-esteem.

In the study, researchers performed a meta-analysis on eight studies of Tai Chi for stress. They found that Tai Chi helped reduce stress among healthy adults and among adults with some chronic health problems. Overall, the improvement in measured stress was quite large, with an effect size of 0.66. An effect size is a way of describing the importance of a measure when it is not on a familiar scale. It is the difference in the average of the groups divided by the average variability. To put improvement of the reduction in stress in perspective, an equivalent effect size of 0.66 for IQ would correspond to a 10 point change, or a change in the weight of American male of 18 lbs.

For anxiety, eight studies were analyzed with similar results. Overall, Tai Chi had an effect size of 0.66 in the reduction in symptoms of anxiety. While it makes sense that Tai Chi has similar effect on stress and anxiety, the fact that observed effect sizes are the same coincidence.

Researchers analyzed 13 studies for depression. The results of the meta-analysis showed that Tai Chi tended to reduce depression. The studies involved individuals with a wide range of conditions including rheumatoid arthritis, osteoarthritis, fibromyalgia, depressive disorders, sedentary obese women and seniors with cardiovascular risk factors. The effect size for the reduction of symptoms of depression was 0.56.

While only two of the studies included in this analysis studied individuals with clinical depression, the evidence suggest that Tai Chi helps with symptoms of depression whether or not someone is clinically depressed. Furthermore, in the study on the benefits of Tai

Chi for seniors with diagnosed depression described earlier, it was shown that Tai Chi added to the benefits that they got from Lexapro (escitalopram). This makes Tai Chi a great choice for individuals with symptoms of depression whether or not they are taking medications for depression.

For mood, the researchers performed a meta-analysis of six studies and found an effect size of 0.45. While the overall evidence from the studies supports the view that Tai Chi has a beneficial effect on mood, the authors noted that the overall study quality was poor with inadequate control groups in most of the studies.

The authors evaluated four studies of the effects of Tai Chi on self-esteem. All the studies, three of which were randomized clinical trials, reported improvements in self-esteem, however in two studies the results were not statistically significant. Still, the chance of having all four results positive by chance would only be 1 in 16.

The combined results of studies on the psychological benefits of practicing Tai Chi are consistent with what people who practice Tai Chi find obvious and are consistent with recent research showing that physical activity has a beneficial effect on mental health. While the research so far is encouraging, there are still many unanswered questions about the benefits of Tai Chi on psychological outcomes. Few studies specifically examined the difference between Tai Chi and other exercise. In addition, the amount and quality of Tai Chi instruction needed for benefits to be realized has not been adequately studied.

Despite these limitations of the research so far, the pattern is clear: Tai Chi is beneficial to both physical and mental health, and can be safely practiced by almost anyone.

Endnotes

1. Wolf SL, Barnhart HX, Kutner NG, McNeely E, Coogler C, Xu T. Reducing frailty and falls in older persons: an investigation of tai chi and computerized balance training. Atlanta FICSIT Group. Frailty and Injuries: Cooperative Studies of Intervention Techniques. *J Am Geriatr Soc.* 1996 May;44(5):489-97

2. Church J, Goodall S, Norman R, Haas M. The cost-effectiveness of falls prevention interventions for older community-dwelling Australians. *Aust N Z J Public Health*. 2012 Jun;36(3):241-8. Doi: 10.1111/j.1753-6405.2011.00811.x. Epub 2012 Jan 2.
3. Irwin MR, Pike JL, Cole JC, Oxman MN. Effects of a behavioral intervention, Tai Chi Chih, on varicella-zoster virus specific immunity and health functioning in older adults. *Psychosom Med* 2003-9-26 65(5) 824-30
4. Irwin MR, Olmstead R, Oxman MN. Augmenting immune responses to varicella zoster virus in older adults: a randomized, controlled trial of Tai Chi. *J Am Geriatr Soc*. 2007 Apr;55(4):511-7.
5. Komelski MF, Miyazaki Y, Blieszner R. Comparing the health status of U.S. taijiquan and qigong practitioners to a national survey sample across ages. *J Altern Complement Med*. 2012 Mar;18(3):281-6
6. Li F, Fisher KJ, Harmer P, Irbe D, Tearse RG, Weimer C. Tai Chi and self-rated quality of sleep and daytime sleepiness in older adults: a randomized controlled trial. *J Am Geriatr Soc*. 2004 Jun;52(6):892-900
7. Wayne PM, Kiel DP, Krebs DE, Davis RB, Savetsky-German J, Connelly M, Buring JE. The effects of Tai Chi on bone mineral density in postmenopausal women: a systematic review. *Arch Phys Med Rehabil*. 2007 May;88(5):673-80.
8. Shen CL, Williams JS, Chyu MC, Paige RL, Stephens AL, Chauncey KB, Prabhu FR, Ferris LT, Yeh JK. Comparison of the effects of Tai Chi and resistance training on bone metabolism in the elderly: a feasibility study. *Am J Chin Med*. 2007;35(3):369-81.

9. Woo J, Hong A, Lau E, Lynn H. A randomized controlled trial of Tai Chi and resistance exercise on bone health, muscle strength and balance in community-living elderly people. *Age Ageing*. 2007 May;36(3):262-8. Epub 2007 Mar 13.
10. Tsang WW, Hui-Chan CW. Comparison of muscle torque, balance and confidence in older tai chi and healthy adults. *Med Sci Sports Exerc*. 2005 Feb;37(2):280-9
11. Barbat-Artigas S, Filion ME, Dupontgand S, Karelis AD, Aubertin-Leheudre M. Effects of tai chi training in dynapenic and nondynapenic postmenopausal women. *Menopause*. 2011 Sep;18(9):974-9.
12. Li F, Harmer P, Fitzgerald K, Eckstrom E, Stock R, Galver J, Maddalozzo G, Batya SS. Tai Chi and postural stability in patients with Parikinson's disease. *N Engl J Med*. 2012 Feb 9;366(6):511-9.
13. Olmstead RE, Ercoli LM, Riparetti-Brow M, Cyr NS, Irwin MR. Complementary Use of Tai Chi Chih Augments Escitalopram Treatment of Geriatric Depression: A Randomized Controlled Trial. *Am J Geriatr Psychiatry*. 2011 Feb 24. [Epub ahead of print]
14. Iaboni A, Flint AJ. The Complex Interplay of Depression and Falls in Older Adults: A Clinical Review. *Am J Geriatr Psychiatry*. 2012 Apr 27. [Epub ahead of print]
15. Wang C, Schmid CH, Hibberd PL, Kalish R, Roubenoff R, Roness R, McAlindon T. Tai Chi is effective in treating knee osteoarthritis: a randomized controlled trial. *Arthritis Rheum*. 2009 Nov 15;61(11):1545-53.
16. October 16th, 2012: <http://www.cdc.gov/arthritis/basics/osteoarthritis.htm>

17. Fransen M, Nairn L, Winstanley J, Lam P, Edmonds J. Physical Activity for osteoarthritis management: a randomized controlled clinical trial evaluating hydrotherapy or Tai Chi classes. *Arthritis Rheum.* 2007 Apr 15;57(3):407-114
18. Uhlig T, Fongen C, Steen E, Christie A, Ødegård S. Exploring Tai Chi in rheumatoid arthritis: a quantitative and qualitative study. *BMC Musculoskelet Disord.* 2010 Mar 5;11:43.
19. Lee EN, Kim YH, Chung WT, Lee MS. Tai Chi for disease activity and flexibility in patients with ankylosing spondylitis—a controlled clinical trial. *Evid Based Complement Alternat Med.* 2008 Dec;5(4):457-62. Epub 2007 Jul 13.
20. Jones KD, Sherman CA, Mist SD, Carson JW, Bennett RM, Li F. A randomized controlled trial of 8-form Tai Chi improves symptoms and functional mobility in fibromyalgia patients. *Clin Rheumatol.* 2012 Aug;31(8):1205-14. Epub 2012 May 13.
21. Wang C, Bannuru R, Ramel J, Kupelnick B, Scott T, Schmid CH. Tai Chi on psychological well-being: systematic review and meta-analysis. *BMC Complement Altern Med.* 2010;10:23.