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T'ai Chi Chih, an Evidence Based Mindfulness Practice: Literature Review

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Abstract

T'ai Chi Chih (TCC) is a moving meditation positively associated with physiological and psychological conditions, such as immunity to shingles virus, reduction in inflammatory markers, decrease in sympathetic nervous system, geriatric depression and chronic diseases in cancer survivors. Consisting of 19 repetitive movements and one pose, TCC is easy to learn and particularly accessible to the aging population. It is taught by accredited instructors who have completed an intensive training that is standardized worldwide.

This review includes all published randomized controlled trials (RCT) studies focused on TCC to date. Results are summarized and methodology is described. Of particular interest is researchers' notes stating why TCC was selected as the control intervention and how the study participants responded. As an accredited teacher of TCC, the author comments on the usefulness of the practice as an evidence based mindfulness practice. Furthermore, ongoing studies are suggested using TCC for quality of life and lifestyle issues, social, emotional and psychological conditions, and research on specific populations that may benefit from TCC.

Keywords

T'ai Chi Chih, moving meditation, mindfulness, alternative therapy, relaxation

Text

There is a growing body of evidence showing meditative movement practices are viable alternatives capable of improving various physiological and psychological conditions. In this review, research is focused on a moving meditation known as T'ai Chi Chih (TCC). TCC is a contemporary discipline originated in 1974 that has demonstrated efficacy in at least twelve controlled trials over a twenty-year period. The studies reviewed in this article position TCC as an evidence based intervention for physical conditions including chronic diseases in cancer survivors, ⁱ immunity to the shingles virus, ⁱⁱ reduction in inflammatory diseases, ⁱⁱⁱ physical functional performance, ^{iv} sleep quality, ^v and others. In addition, the literature review demonstrates efficacy of TCC with respect to improvement of psychological and mental health conditions such as depression, ^{vi} stress and general well being. ^{vii}

What is T'ai Chi Chih?

Originated in 1974 by Justin Stone, a T'ai Chi Ch'uan master, the practice consists of movements focused on circulating and balancing of Chi, the body's intrinsic energy. TCC consists of 19 standalone movements and one pose that can be done by almost anyone. While the form was originated in the mid 1970's, it is founded upon and incorporates ancient energy movement principles (called yin-yang principles.) Stone originated TCC movements because he believed more westerners would benefit from moving meditation practices if the movements were easy to learn and easy to do.^{viii}

For purposes of this review of research literature, definitions and descriptions from researchers who have used TCC as an intervention in randomized controlled studies are summarized. For the most part, descriptions by researchers frame TCC as a health management intervention that incorporates meditation and repetitive movement to

promote well-being.^{ix} It is also described as a movement based relaxation practice.^x Researchers refer to the balance and shifting of body weight to obtain focused, fluid physical movements that are coordinated with imagery to relax the mind and improve the flow of chi or life energy.^{xi} Detert describes the relaxation of the body as a major component stating, “soft, slow and continuous movement creating circles, ovals, and arcs are used not only to activate and balance the intrinsic energy of the body, but to create a strong mental focus.”^{xii}

Mindful movement meditation

Meditative movement is defined as those practices that utilize movement or posture and a meditative state to achieve deep states of relaxation. It includes practices such as qigong, t'ai chi and others.^{xiii} Physical movement has long been employed as a foundation for cultivating mental skills such as attention, self-control or mindfulness, with recent studies documenting the impact of mindful movement training on focus, attention and cognitive functioning.^{xiv}

TCC is considered meditative movement because it combines physical activity with meditation.^{xv} As a form of moving meditation, TCC uses a series of fluid, continuous and repetitive movements integrated by mind concentration, balance and shifting of body weight, muscle relaxation and breath.^{xvi} The mental concentration makes the practice a moving meditation.^{xvii}

Kabat-Zinn offers an operational definition of mindfulness as an awareness that emerges by way of paying attention on purpose, in the present moment and nonjudgmentally, to the unfolding of experience moment by moment.^{xviii} Recent studies in neuroscience affirm that awareness is a key target in contemplative practices.^{xix} Justin Stone attributes “awareness as the root of TCC, which is essentially inner oriented.”^{xx}

Lavretsky adds that the practice incorporates meditation and physical activity to promote a sense of well being and to foster control over negative symptoms associated with

depression.^{xxi} TCC derives from ancient practices of qigong and t'ai chi which are a “series of graceful movements linked together in a continuous sequence so that the body is constantly shifting from foot to foot, with a lower center of gravity.”^{xxii} Movements incorporate deep breathing and mental concentration to achieve harmony between body and brain. Both t'ai chi and qigong movements can be practiced standing, walking, sitting or lying down.^{xxiii} TCC can be practiced standing or seated; it can also be practiced mentally.

Qigong and TCC teach balanced standing and movement accompanied by spatial, proprioceptive and interoceptive awareness. This brings conscious awareness to the processes of grounding, orientation, and correct relation of the body to gravity. Regular practice brings about a calm, centered state in which one is responding to the actual present condition rather than preparing for past or future events like the outcome described in mindfulness meditation.^{xxiv}

Meditative movement forms, such as TCC, are holistic in nature and have increased in popularity over the past few decades. Several RCT's have evaluated these interventions from multiple perspectives.^{xxv} A number of these studies are discussed in the following sections.

T'ai Chi Chih practice improves physical and mental health

To date researchers have published 12 studies using control groups that show TCC's efficacy; all except two (Shaller, 1996, Zacharia, 2015) are RCT's. One additional study used pre and post tests but no control group (Detert, 2006.) All of these studies were focused on the effects of TCC practice on physical and/or mental emotional conditions.

We will summarize findings of the TCC-specific studies through several lenses:

- sleep quality
- immunity and reduction of inflammation
- exercise and physical performance

- stress, quality of life, mental-emotional functioning

Sleep Quality

Compared to control groups receiving an educational sleep seminar, participants in a TCC group had improved sleep quality and diminished fatigue.^{xxvi} Sleep is intended to be restorative for living systems; disruptive sleep patterns affect the normal diurnal rhythm of many regulatory systems including negative effects on glucose, lipids, inflammation and blood pressure.^{xxvii} Poor sleep quality is a common difficulty for older adults and remains untreated in a majority (85%) of people increasing risks of depression, anxiety and pain problems. The treatment of choice for those who receive treatment is medication; unfortunately, medications may have serious effects on older adults including daytime confusion, drowsiness, falls and fractures in addition to adverse interactions with other medications.^{xxviii}

Researchers at Cousins Center for Psychoneuroimmunology at UCLA tested a hypothesis that an intervention of relaxation therapy and moderate exercise would positively impact sleep quality on older adults with moderate sleep complaints using TCC compared to a control group in Health Education (HE) class. The RCT consisted of sixteen weeks of teaching followed by practice for nine additional weeks. The Pittsburgh Sleep Quality Index (PSQI) was used on the volunteer sample of 112 healthy adults between the ages of 59 and 86. Results showed that after 25 weeks, subjects in the TCC group were more likely to achieve a treatment response, as defined by PSQI less than 5, compared to those in HE ($P < 0.05$). Subjects in the TCC group with poor sleep quality also showed significant improvements in PSQI global score ($P < 0.001$) as well as in the sleep parameters of rated sleep quality ($P < 0.05$), habitual sleep efficiency ($P < 0.05$), sleep duration ($P < 0.01$), and sleep disturbance ($P < 0.01$).^{xxix}

Additional trials by multidisciplinary researchers at Cousins Center, the Division of

Geriatrics at UCLA and the Department of Psychology at University of Arizona compared groups randomly assigned to TCC, Cognitive Behavioral Therapy (CBT), or Sleep Seminar (SS) measuring multiple biomarkers of disease risk in 109 older adults with insomnia. Participants received two-hour group sessions weekly for four months. The 8 biomarkers measured using clinical lab cutoffs defined as abnormal were: high-density lipoprotein, low-density lipoprotein, triglycerides, hemoglobinA1c, glucose, insulin, C-reactive protein, and fibrinogen. Results of this randomized controlled efficacy trial found both TCC ($p=.04$) and CBT ($p=.001$) reduced risk scores significantly among older adults with high multisystem biological risk at entry after one year. Given that these clinical biomarkers are associated with cardiovascular, metabolic, and inflammatory disease risk, improving sleep quality has the potential to reduce the risk of chronic disease in older adults with insomnia.^{xxx}

Immunity and Reduction of Inflammation

Incidence and severity of herpes zoster (shingles) increase markedly with increasing age in association with a decline in varicella-zoster virus (VZV) specific cell-mediated immunity (CMI). Irwin's study examined whether TCC affects VZV specific immunity and health functioning in older adults who, on average, show impairments of health status and are at risk for shingles. 36 men and women 60 years or older were assigned randomly to a 15-week program of TCC instruction or a wait list control condition. VZV-specific CMI was measured at baseline and at 1-week post intervention. Health functioning (Medical Outcome scale: SF-36) was assessed at baseline, and at 5, 10, and 15 weeks during the intervention, and at 1-week post intervention. Findings were that VZV-specific CMI increased 50% from baseline to 1-week post intervention in the TCC group ($p = 0.05$) but was unchanged in the wait list control group. Older adults who had impairments of physical status at baseline showed the greatest increases of SF-36 role-physical ($p = .01$) and physical functioning ($p = .001$) during the TCC intervention. Participation in

TCC for 15 weeks led to an increase in VZV-specific CMI. Gains in health functioning were found in participants who received TCC and were most marked in those older adults who had the greatest impairments of health status.^{.xxxix}

An RCT was conducted to evaluate the effects of TCC on circulating markers of inflammation in older adults. Inflammation plays an increasingly prominent role in health and well being as people age. Circulating levels of inflammatory markers rise with age even in healthy individuals, and the proportion of person with elevated levels of IL-6 rises markedly among persons older than 70 years. In the elderly, many of the diseases that contribute most to disability, morbidity, and mortality stem in part from aberrant inflammation. 83 healthy older adults, aged 59 to 86 years, were assigned to either TCC or HE. Measurements included circulating levels of interleukin 6 (IL-6), C-reactive protein (CRP), soluble IL-1 receptor antagonist (sIL-1R), sIL-6R, soluble intercellular adhesion molecule (sICAM) and IL-18. Results showed that among those older adults with high levels IL-6 at entry, TCC produced a drop of IL-6 levels comparable to those found in TCC and HE subgroups who had low levels of IL-6 at entry whereas IL-6 in HE remained higher than the TCC and HE subgroups with low entry IL-6. Conclusions of researchers was that TCC can be considered a useful behavioral intervention to reduce circulating levels of IL-6 in older adults who show elevated levels of this inflammatory marker and are at risk for inflammation-related morbidity.^{.xxxix}

Exercise and Physical Performance

Three studies have concluded that TCC is a beneficial exercise option for older adults.^{.xxxix} These studies focused on the feasibility and acceptability of TCC as a form of exercise that seniors would be willing to do. Campo's group studied female cancer survivors (n = 63) with some limitations in physical functioning; Shaller's sample was drawn from a community senior center (n=46); Zacharia studied healthy, inactive women

between the ages of 45 and 65 (n=38.) Shaller and Zacharia had a comparison group that was instructed to do their normal daily activities without adding any additional exercise for the duration of the study. Campo organized a control group that attended HE class with no exercise.

Zacharia's team from the University of Oklahoma and the University of Northern Colorado were interested in physical functional performance and used a battery of 10 measurements, the Continuous Scale Physical Functional Performance (CS-PFP-10). Scores were calculated for five domains: upper body strength, upper body flexibility, lower body strength, balance/coordination and endurance. Improvements in the TCC group from pre to post intervention ranged from a low of 19.1% positive change in endurance to 32.5% positive change in lower body strength. All five domains showed strong effects supporting the conclusion that TCC participation resulted in meaningful improvements in physical functioning and physical reserve.^{xxxiv}

Shaller's study also focused on balance and flexibility in addition to mood, health status and blood pressure. Participants in the TCC group practiced one hour a week for 10 weeks or a total of 10 hours of teacher directed group practice. This is considerably less managed intervention than one-hour sessions twice a week for 8 weeks (Zacharia) and one hour sessions three times a week for 12 weeks (Campo). Shaller used a battery of five measurements but did not control for group differences at baseline. In spite of some limitations, Shaller's study was the first to report an improvement in balance after a TCC intervention for older adults. The other four factors measured in Shaller's study did not show significant differences from pre to post tests.^{xxxv}

While the primary purpose for the Campo study was to determine the feasibility and acceptability for senior cancer survivors of a 12 week TCC intervention compared to a HE class, researchers also explored the effects of TCC on mental and physical health which is discussed in the next section.^{xxxvi}

Stress, Quality of Life, Mental-Emotional Functioning

Detert and colleagues conducted a pilot study using a single sample pre-post design to inquire into the effects of TCC on the physical symptoms of stress and general well being. 23 teachers, predominantly females between the ages of 25 to 32, completed 15 hours of instruction with 4 additional weeks of unsupervised practice. The methods included both a qualitative component and pre-posttests using the Schedule of General Well Being (GWB) and the Taylor Manifest Anxiety Scale (TMAS.) The six subscales of the GWB which include General Health, Vitality, Positive Well Being, Depression, Anxiety, and Self Control all showed significant positive change from pre to posttest; three scales at .05 level and three scales at .0001 level. The TMAS results also showed significant improvement at the .0001 level at posttest. The qualitative data analysis revealed four major themes: General Physical Benefits, Physical Ailment Benefits, Psychological/Mental Benefits, and Spiritual Benefits. In spite of the limitations of the research design, the researchers from University of Wisconsin-LaCrosse, concluded that TCC, being easy to learn, has potential to enhance well being and reduce stress symptoms of teachers.^{xxxvii}

The Campo research team from University of Utah, UCLA, Huntsman Cancer Institute and Semel Institute for Neuroscience used both quantitative measurements and a qualitative component. Results found no significant differences between the TCC group and the HE group on the SF 36 v1 Health Survey. Researchers suggested that with a low functioning group such as cancer survivors, longer and more intense TCC intervention might be needed to help improve Quality of Life. Researchers reported that the qualitative analysis indicated that the participants were very satisfied with the trial and commented on both physical and mental benefits they felt they had gained from TCC.^{xxxviii}

Lavretsky and her colleagues at UCLA conducted the first RCT to test the efficacy of TCC versus HE as an adjunct to standard antidepressant medication treatment of geriatric depression. There were 73 participants aged 60 and older who had a diagnosis of major depression. A battery of tests administered included evaluations of depression, anxiety, resilience, health-related quality of life, cognition and inflammation at baseline and during 14 week follow up. The groups were randomly assigned to 10 weeks, 2 hours per week, of TCC or HE class. Their results reported greater improvements in depression, health-related quality of life, and memory in the TCC group of older depressed participants. The researchers concluded that TCC is a relatively simple mind-body exercise that can provide substantial additional benefits not only for depression but also for physical functioning, cognition, quality of life and resilience. They further commented that very few interventions in late life depression improve cognitive functioning in this population.^{xxxix}

An RCT conducted by Motivala and associates from UCLA and National Institutes on Aging, Baltimore, found that practicing TCC acutely decreases Sympathetic Nervous System (SNS) activity in their sample. One distinguishing factor in the Motivala study is that 9 of the 19 participants in the TCC arm were men. Most of the TCC studies to date have had primarily women participants. The researchers had 19 TCC practitioners who had already been trained and knew the movements practice for 20 minutes. The control group (8 TCC-naïve adults) watched a video on the benefits of exercise (passive rest.) Autonomic assessments were taken prior to and after the 20 minute period in addition to blood pressure and heart rate. Electrocardiography and impedance cardiography signals were measured. Results showed that TCC performance significantly decreased sympathetic activity as indexed by preejection period ($p = .01$). In contrast, there was no change in preejection period following passive rest or slow-moving physical activity. Neither blood pressure nor heart rate changed after TCC performance.^{xi}

TCC is well suited to RCT research

Compared to the extensive body of work on mindfulness-based practices, fewer scientific studies have examined the mechanisms underlying movement-based embodied contemplative practices. However, movement-based practices have been shown to alleviate the symptoms of various clinical conditions and elicit measurable changes in physiological stress markers, cognitive functioning, sensorimotor acuity, as well as emotional states. An important challenge for contemplative scientists is to advance understanding of the mechanisms underlying these complex practices.^{.xli}

Davidson and Kazniak offer a guide for comparison treatment using a mindfulness-based intervention. They suggest the following criteria for constructing a rigorous control condition:

- Structural matching of dosage: The interventions should be equivalent in length.
- Matching of homework/daily practice: The interventions should require the identical amount of practice.
- Participants should not know which is the “experimental” intervention: Participants should be blinded to which intervention the experimenter is targeting for study. Examiners who are engaged in data collection should be blind to the intervention to which the participant has been assigned.
- Expertise and confidence of the instructors should be matched: The comparison intervention should be taught by instructors who are comparably trained in comparison to the mindfulness teachers and who genuinely believe that the intervention they are teaching will produce beneficial change.^{.xlii}

Michael Irwin at UCLA Cousins Center for Psychoneuroimmunology has led the way with using TCC as an experimental intervention in medical RCT's; he is involved with more than half the published articles on TCC in medical journals. Irwin considers TCC

“particularly suitable for evaluation in randomized controlled trials, as TCC is a standardized series of . . . simple, repetitive non-strenuous movements.”^{xliii} Because of its moderate intensity, steady rhythm and low physical and mental tension, TCC has been suggested as an appropriate intervention for elderly patients who are not otherwise able to adhere to physical exercise. TCC offers standardized training and practice schedules, lending an important advantage over prior relaxation response based therapies, according to Irwin.^{xliv} It requires no equipment or special clothing; it can be done on a relatively flat surface outside or inside. TCC movements consist of 19 movements and one standing pose: Rocking Motion, Bird Flaps its Wings, Around the Platter, Around the Platter variation, Bass Drum, Daughter on the Mountaintop, Daughter in the Valley, Carry the Ball to the Side, Push Pull, Pulling in Energy, Pulling Taffy, Pulling Taffy-Anchor, Pulling Taffy-Wrist Circles, Pulling Taffy-Perpetual Motion, Working the Pulley, Light at the Top of the Head, Joyous Breath, Passing Clouds, Six Healing Sounds, and Cosmic Consciousness Pose. It is taught by accredited teachers and is considered to be fairly standardized, easy to learn and can be done by almost anyone standing or sitting.^{xlv}

Qualitative comments from TCC study participants

Campos and Detert reported on outcomes from a qualitative segment of their studies. Participants in the TCC groups felt that they derived mental-emotional and physical benefits from the practice.

In regard to what they liked about TCC, participants commented on the mental (25%) and physical benefits (19%) gained from TCC. Participants reported that TCC helped them feel more relaxed, less stressed, and better emotionally. Physically, they reported that TCC helped with balance, increased energy, and improved sleep. Additionally, TCC participants enjoyed the opportunity to interact and practice TCC with other female survivors (19%).^{xlvi}

From the Detert study participants offered the following comments: ^{xlvii}

“I have experienced an increase in my daily energy levels and endurance”

“It refreshes me and makes it easier to focus on my next task.”

“When I practice T’ai Chi [Chih] I experience periods of relief from this tension.”

“I am more open and connected in my personal relationships and feel much less stress in my daily life.”

“The quality of my mornings, my attitude for the day beginning, my eating habits, my sleeping ease and much more are all positively changed...and in such a short time.”

“I noted...having increased energy, less achiness in joints and the beginnings of more flexibility.”

“Steps three, ten, and eleven seemed to melt the frozen stiffness of my neck and shoulders... I have less cracking sensations and much more mobility in the rotation of my head. My ankle, heel problem is virtually gone.”

“Previous to doing T’ai Chi [Chih], I have often had digestive troubles and one very good benefit I’ve noticed is that I have not been bothered by constipation.”

“On an internal level, I have begun to experience new and different levels of inner calmness, control, focus, purpose of mind, enhanced concentration, intent alertness, and spiritual depth.”

“This seems to center me and increases my inner peace.”

“I have...a sense of grace, energy, and calmness.”

“There is always a sense of calmness and joy that increased as the practice time continues.”

Conclusions and Recommendations

TCC is a “user friendly” practice which can be easily taught to a wide range of populations; for example ages ranging from pediatrics to geriatrics, individuals with physical limitations, emotional concerns, and mental health issues. It is learned in a

relatively short period of time making it a perfect modality for research studies. No special equipment is needed; participants can do TCC standing or seated.

The studies reported here affirm TCC's efficacy as an evidenced based intervention for a variety of physical and mental conditions. Additional studies are needed to determine its effectiveness as an intervention for lifestyle changes such as smoking cessation, substance abuse prevention, truancy prevention and anger management. Furthermore we recommend TCC studies with specific populations, such as prison populations, individuals with early onset dementia, adults and youth with epilepsy, and at-risk youth, for example.

Acknowledgements

The author acknowledges several accredited T'ai Chi Chih instructors for their generous help with preparing this article. Deanna Rasch, MA-LIS, Instruction and Reference Librarian at Colorado Mesa University and TCC Teacher at Regis University. Richard Detert, Ph.D, Professor Emeritus at University of Wisconsin-LaCrosse and long time TCC instructor throughout the Midwest. Mary Case, Medical Transcriptionist and Editor; TCC instructor at senior centers and assisted living facilities in California. April Leffler, MA Clinical Psychology, instructor of TCC and Physical Education at Widener University and the YMCA of Philadelphia. Stephen Thompson, TCC Instructor at North Mississippi Medical Center. Bruce Eisenmenger, MA, ABD, LP, Psychotherapist with Center for Integrative Therapies and TCC teacher in St Paul, MN. Leya Cragin, MA who teaches TCC in the Lakewood and Denver CO area. Lisa Otero, J.D. who teaches TCC and yoga in Oxford and Ventura, California.

Disclosure Statement

No competing financial interests exist.

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