

Tai Chi Chuan: Mind-Body Practice or Exercise Intervention? Studying the Benefit for Cancer Survivors

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Tai chi chuan (TCC) has been used as a mind-body practice in Asian culture for centuries to improve wellness and reduce stress and has recently received attention by researchers as an exercise intervention. A review of the English literature on research in TCC published from 1989 to 2006 identified 20 prospective, randomized, controlled clinical trials in a number of populations, including elderly participants (7 studies), patients with cardiovascular complications (3 studies), patients with chronic disease (6 studies), and patients who might gain psychological benefit from TCC practice (2 studies). However, only the studies of TCC in the elderly and 2 studies of TCC for cardiovascular disease had adequate designs and size to allow conclusions about the efficacy of TCC. Most (11 studies) were small and provided limited information on the benefit of TCC in the settings tested. There is growing awareness that cancer survivors represent a population with multiple needs related to physical deconditioning, cardiovascular disease risk, and psychological stress. TCC as an intervention may provide benefit to cancer survivors in these multiple areas of need based on its characteristics of combining aspects of meditation and aerobic exercise. However, little research has been conducted to date to determine the benefit of TCC in this population. We propose a model to study the unique characteristics of TCC compared to physical exercise that may highlight characteristic features of this mind-body intervention in cancer survivors.

Keywords: Tai chi chuan; cancer survivors; quality of life; exercise; physical fitness; well-being

Tai Chi Chuan in Traditional Chinese Culture

Tai chi chuan (TCC) evolved from martial arts and breathing exercises in China hundreds of years ago and had developed a unique style by the end of the Ming Dynasty (1368-1644 AD). Practicing TCC simultaneously trains the mind, body, and qi. "Training the mind" refers to the state of calmness and concentration

of the mind achieved during TCC practice, which is intended to quiet the central nervous system.^{1,2} "Training the body" refers to gentle and slow movements, which also improve the elasticity of ligaments and muscle strength.^{3,4} TCC has been practiced for centuries by all age groups for wellness and to maintain health.

Research Studies of TCC: Methodological Challenges

Growing interest in TCC worldwide has fostered increased research activity into physiology and effects of TCC. TCC combines characteristics of meditative practice and aerobic exercise, which individually and combined may offer physiological and psychological benefit. Meditation and breathing practice alone without aerobic exercise have beneficial effects on blood pressure, heart rate, autonomic function, lipid profile, and immunity as well as stress control and mood enhancement.^{5,6} TCC practitioners achieve better cardiopulmonary functional status compared to aerobic exercise of equal intensity, which may be a result of the integration of breathing techniques and meditation with aerobic exercise, as is characteristic for TCC.⁷

More traditional exercise improves mood state and self-esteem.^{8,9} The surgeon general recommends 30 minutes of moderate-intensity exercise 5 days per week to improve psychological well-being and reduce feelings of anxiety and depression.¹⁰ TCC practice is equivalent to moderate-intensity aerobic exercise

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and may be associated with a number of health benefits. Exercise literature has classified TCC as not exceeding 55% in maximum oxygen intake and 4 metabolic equivalent units in mean energy expenditure.¹¹ Heart rate during TCC practice typically increases by 56% to 70%^{12,13} of maximum heart rate in various studies when adjusted to age of the study subjects. TCC also showed a significantly lower ventilatory equivalent (V_e/V_{O_2} max) than other forms of exercise at equal intensity.¹⁴ While TCC practice has demonstrated some alleviation of depressive symptoms,¹⁵ one could attribute these benefits to the aerobic exercise benefit of this mind-body practice.

Stress management components can result in a similar cardiovascular benefit as aerobic exercise. Recent randomized studies of stress management and exercise in patients with coronary heart disease demonstrated improvement in cardiovascular markers (flow-mediated dilation, heart rate variability) and reductions in psychological distress,¹⁶ as well as reduction in cardiac disease risk.¹⁷

TCC as a mind-body practice combines features of meditation and physical exercise, posing a scientific challenge to understand the health benefits of TCC that may arise from each of these 2 features and their combined effect.¹⁸ Brown et al¹⁹ randomized 69 healthy women to sedentary control, low-intensity walking, moderate-intensity walking, low-intensity walking plus relaxation (relaxation tapes worn during exercise), or TCC. Both the moderate-intensity exercise and TCC groups demonstrated improvement in mood and self-esteem. However, only TCC provided psychological benefit.¹⁹

Current Research on TCC

To determine whether and how many prospective trials of TCC have employed study designs that include either an exercise control or an appropriate comparison group to study benefits of TCC related to aerobic exercise and meditation, a search of publications in English was conducted in the PubMed, EMBASE, Allied and Complementary Medicine (AMED), and Manual, Alternative and Natural Therapy (MANTIS) databases. Search terms used to identify studies included *clinical trial, randomized controlled trial, evaluation study, meta-analysis, cross-sectional studies, follow-up studies, cohort studies, cohort analysis, prospective studies, case-control studies, controlled study, and comparative study*. Reviews, retrospective studies, and 2 studies that applied a combination regimen with TCC movements were removed from further analysis. One study was removed that was a reanalysis of an earlier study,¹⁴ and 2 were removed that represented a reprint of an article²⁰ that was “selected as the best paper in the

1990's.”²¹ The search yielded a total of 93 articles published between 1989 and 2006: 66 studies were identified in PubMed, including 35 designated as randomized controlled trials. Searches of EMBASE yielded an additional 11 studies, and the MANTIS/AMED databases produced an additional 16 studies not previously cited. Because of the inherent difficulty in evaluating an intervention without an adequate comparison group, only randomized controlled trials are included in this analysis. Most studies on TCC have been cross-sectional, examining practitioners versus nonpractitioners. Of the original 62 studies that resulted from searching PubMed, EMBASE, and MANTIS/AMED, 20 (see Table 1) were included in this discussion as they met the inclusion criteria: randomized prospective study of TCC-naïve participants, defined TCC intervention, at least 1 control group, and adequate sample size allowing for statistical analysis of study outcomes. Overall, TCC practice has been studied in a number of patient populations, resulting in various health benefits.

TCC in the Elderly

Of the 20 articles reviewed, 6 recruited elderly populations, including 5 from geriatric community settings (see Table 2). TCC is a low-impact exercise that maintains a focus on balance²⁰ and thus has been applied as one method to reduce falls in the elderly. Many of the randomized controlled trials have come from the work of Li et al.²²⁻²⁴ This research team randomized 256 elderly study participants to a 6-week TCC intervention or stretching control and demonstrated a 55% reduction in risk of falling in the TCC group.^{22,24} A group of elderly subjects who completed a 6-month TCC intervention showed similar reductions in falling risk at 6-month follow-up compared to a stretching control group.²⁴ Furthermore, Li et al²³ found 6-month TCC practice to improve sleep quality and sleep duration compared to a low-impact exercise control.²³

Wolf has published extensively on the benefits of TCC practice in the elderly. In a landmark study that was recognized as one of the best articles of the 1990s,²¹ Wolf et al²⁰ randomized 200 elderly to either computer-balanced training, TCC, or an educational control. The TCC group reported reductions in fear of falling, demonstrated a reduced rate of fall occurrences, and had a lower systolic blood pressure after a 12-minute walk test. A 48-week randomized matched-groups trial with a wellness education control group showed TCC practice to improve performance in a chair-rise test and cardiovascular outcomes (decreases in systolic blood pressure and resting heart rate) in 311 transitionally frail elderly.²⁵ Further examinations by Wolf, however, were unable to show a reduction in risk ratio of falling in the same cohort.²⁶

Table 1. Randomized Controlled Trials Examining Tai Chi Interventions With Tai Chi–Naïve Participants

<i>Author</i>	<i>Control Group</i>	<i>Patient Population</i>	<i>Outcome/Results</i>
Li et al (2005) ²²	Stretching control group	256 community-dwelling elderly	Risk for falls was 55% lower in the TCC group than the stretching control
Mustian et al (2004) ⁷²	Psychosocial support group as control	21 breast cancer survivors	TCC group exhibited improvements in health-related quality of life and self-esteem from baseline to 6 and 12 wk, while the support group exhibited declines
Wang et al (2005) ³⁵	Control group provided with education on nutrition and medical information	20 rheumatoid arthritis patients	TCC group improved in physical functioning
McGibbon et al (2005) ³¹	Control group received conventional vestibular rehab	36 older adults with vestibulopathy	Gait-time improvements were seen in both groups; between-group analysis suggests TCC group improvements are due to reorganized lower extremity neuromuscular patterns (faster gait and reduced excessive hip compensation)
McGibbon et al (2004) ³⁰	Control received vestibular rehab	26 patients with vestibulopathy	Improvements on whole-body and foot-fall stability, not gaze stability, for TCC compared to the VR group
Chou et al (2004) ¹⁵	Wait-list control	30 depressed patients	TCC showed reduction in depressive symptoms
Li et al (2004) ²⁴	Stretching control group	256 physically inactive older adults	TCC group showed improvements in measures of functional balance at the intervention end point significantly reduced their risk for falls during the 6-mo postintervention period, compared to control
Yeh et al (2004) ³⁹	Wait-list control that received usual care	30 patients with chronic stable heart failure	At 12 wk, TCC group showed improvement in quality-of-life scores, increased 5-min walk test, and decreased serum B-type natriuretic peptide levels compared to control group
Li et al (2004) ²³	Low-impact exercise control	118 patients aged 60-92 y	TCC group demonstrated significant improvements in sleep quality, latency, duration, efficiency, and sleep disturbances
Chan et al (2004) ⁹¹	Sedentary control	132 postmenopausal women	Bone marrow density loss shown to be slower in TCC group (both groups still showed bone loss over the year)
Wolf et al (2003) ²⁶	Control group received wellness education	311 elderly subjects aged 70-97 y	Risk ratio of falling not statistically significant in TCC group
Thomas et al (2005) ²⁹	3 arms: TCC group, resistance exercise, and normal physical activity control	207 elderly subjects	No difference between TCC group, control, and resistance exercise group and control in primary outcomes; only result was improvements in insulin sensitivity in resistance vs control
Tsai et al (2003) ¹³	Sedentary control	76 subjects with normal or stage 1 hypertension	TCC group showed significant decreases in systolic blood pressure; total serum cholesterol decreased; HDL increased; both state and trait anxiety decreased
Irwin et al (2003) ³⁷	Wait-list control	36 healthy adults with history of chickenpox	Varicella-zoster-specific cell-mediated immunity increased 50% in TCC group; significant increase in SF-36 scores were higher with TCC
Song et al (2003) ³⁶	Control group not described	72 osteoarthritis patients	TCC experienced less pain and stiffness and reported fewer difficulties in physical functioning
Channer et al (1996) ³³	3 arms: TCC group, aerobic exercise, or cardiac support group	126 patients recovering from MIs	TCC group demonstrated decreases in diastolic BP and heart rate; decreases in systolic BP were seen in both TCC and aerobic exercise group

(continued)

Table 1. (continued)

<i>Author</i>	<i>Control Group</i>	<i>Patient Population</i>	<i>Outcome/Results</i>
Wolf et al (1996) ²⁰	3 arms: TCC group, computerized balance training, or educational control	200 elderly subjects aged 70 y and older	Lowered BP and reductions in fear of falling in TCC group; after adjusting for fall risk factors, TCC reduced risk of multiple falls by 47.5%
Brown et al (1995) ¹⁹	5-arm study: sedentary control, low-intensity walking, moderate-intensity walking, low-intensity walking plus relaxation, or mindful/TCC exercise	69 women	TCC-like group showed reduction in mood disturbance and general mood; moderate-intensity walking women showed greater satisfaction with physical attributes, and moderate-walking men showed greater satisfaction with physical attributes
Robins et al (2006) ⁹²	Wait-list control mentioned, not described	HIV patients (59 completed TCC intervention; other groups not reported)	Only demographic and qualitative data are reported here, more forthcoming
Galantino et al (2005) ³⁸	Exercise and normal activity control	38 HIV patients included in data analysis	Improved physical functioning and improved quality of life in both TCC and exercise groups

TCC = tai chi chuan; VR = vestibular rehab; HDL = high-density lipoprotein; MI = myocardial infarction; BP = blood pressure.

Table 2. Randomized Controlled Trials of Tai Chi Chuan (TCC) in Elderly Participants

<i>Author</i>	<i>Patient Population</i>	<i>Control Group</i>	<i>Number of Classes and Regimen</i>	<i>Results</i>
Li et al (2005) ²²	256 community-dwelling elderly patients	Stretching control group	1-h classes, 3 times/wk for 6 wk	Lower risk of falling in the TCC group
Li et al (2004) ²³	118 subjects aged 60-92 y	Low-impact exercise control	60-min session, 3 times/wk for 6 mo	Improved sleep in TCC group
Li et al (2004) ²⁴	256 physically inactive older adults	Stretching control group	3 (~60 min) times per week for 6 mo	Improved balance in TCC group and reduced risk of fall at follow-up
Wolf et al (2003) ²⁶	311 elderly (aged 70 to 97 y)	Control group received wellness education	2 times/wk, increasing from 60 to 90 min over 49 wk	Risk ratio of falling not statistically significant in TCC group
Wolf et al (1996) ²⁰	200 elderly (aged 70 y and older)	3 arms: TCC group, computerized balance training, or educational control	15 wk, not clear	Lowered blood pressure in TCC group; TCC was found to reduce the risk of multiple falls by 47.5%
Thomas et al (2005) ²⁹	207 elderly subjects	3 arms: TCC group, resistance exercise, and normal physical activity control	1 h; 3 times/wk for 12 mo	No difference between TCC group, control, and resistance exercise group and control in primary outcomes

Other researchers have also reported little added benefit of TCC over other physical activity in elderly populations.^{27,28} Thomas et al²⁹ randomized 207 elderly subjects to resistance training, 12 months of TCC, or a normal activity control. The resistance-training arm was the only group to show improvements as measured by an insulin-sensitivity index. The lack of difference between the study arms in body composition, blood pressure, lipids, and glycemic or insulin sensitivity indices has been attributed²⁹ to the low-intensity exercise of the TCC group.

Two trials of patients with vestibulopathy reported by McGibbon et al^{30,31} tested 10 weeks of TCC versus

exercise and demonstrated improvements in gait function in the TCC group (a measure of balance). However, the TCC group did not show improvements in gaze stability.³⁰

TCC and Cardiovascular Disease

Of the 20 studies in Table 1, 4 examined patients with heart complications, and only 2 of these recruited more than 75 participants (see Table 3). TCC practice improved quality-of-life (QOL) scores and increased performance in a 5-minute walk test in patients with chronic stable heart failure compared to a wait-list

Table 3. Randomized Control Trials of TCC in Participants With Hypertension or Coronary Artery Disease

Author	Patient Population	Control Group	Number of Classes and Regimen	Results
Tsai et al (2003) ¹³	76 subjects with normal or stage 1 hypertension	Sedentary control	3 times/wk for 50 min for 12 wk	TCC group showed significant decreases in systolic blood pressure and improvements in lipid profile
Channer et al (1996) ³³	126 patients recovering from myocardial infarctions	3 arms: TCC group, aerobic exercise, or cardiac support group	1 h 2 times/wk for 3 wk, then weekly for 5 wk	TCC group demonstrated decreases in diastolic blood pressure and heart rate

control.³² TCC decreased blood pressure, improved fasting lipid profiles, and decreased state and trait anxiety in hypertensive patients compared to sedentary controls.¹³ Patients post-myocardial infarction following an aerobic exercise program showed a reduction in systolic blood pressure, whereas TCC practice was associated with reductions in both systolic and diastolic pressure.³³ Clinical trials prospectively investigating the effect of TCC in other populations at risk for cardiovascular disease are lacking.

TCC Effects on Chronic Disease and Immunity

TCC may be beneficial for chronic health problems³⁴ and result in stimulation of the immune system. TCC improved physical functioning in patients with rheumatoid arthritis³⁵ compared to a nutritional and medical education control. A 12-week TCC intervention also improved reported pain in osteoarthritis patients.³⁶ TCC practice 3 times per week resulted in a boost in varicella-zoster virus-specific cell-mediated immunity in 36 healthy adults with a history of chickenpox.³⁷ Thirty-eight HIV patients randomized to TCC or traditional aerobic exercise demonstrated improvement in physical functioning and some measures of QOL in both study groups compared to sedentary controls.³⁸ A small, uncontrolled observational study of TCC practice resulted in decreased monocyte production, an increase in the ratio of T helper cells to suppressor cells, and an increase in regulatory T cells.³⁹ Most studies on the effect of TCC on the immune system and in chronic illness are small, provide limited information on study group characteristics, collect predominantly qualitative data, and lack appropriate controls, which limit the interpretation of the study results.

Psychological Benefits of TCC

TCC practice may improve psychological functioning. In a 4-arm, randomized controlled trial, TCC was more effective than neutral reading in reducing state of anxiety in TCC practitioners.⁴⁰ In this study, the

psychological benefit was similar in the moderate exercise arm. In a cross-sectional study of TCC beginners and practitioners, TCC subjects reported less depression, anger, fatigue, confusion, and state anxiety during the study period.¹⁸ A randomized controlled study of a 12-week-long TCC program for borderline hypertensive individuals showed trait anxiety reduction in the study group.¹³ Similarly, a 12-week TCC intervention reduced depressive symptoms in the elderly compared to controls.¹⁵

In summary, our review of randomized controlled trials suggests that TCC may improve the risk of falling in elderly persons, balance for vestibulopathy patients, and cardiovascular conditions, physical functioning, and pain in patients with chronic conditions. TCC may be beneficial for immunocompromised patients and may alleviate anxiety and depression. However, only the studies in elderly populations and patients with cardiovascular disease were designed to allow some degree of confidence in the clinical validity of the study outcomes, while the study results of TCC in patients with chronic illness, immune-compromised patients, and participants treated for psychological benefit have to be considered preliminary due to small sample size, and they await confirmation in larger clinical trials.

Cancer Survivors

Diagnosis and treatment of cancer represent a major lifetime stressor for any patient.⁴¹⁻⁴³ In addition, cancer treatment is frequently associated with fatigue,⁴⁴⁻⁴⁷ physical deconditioning,^{48,49} and metabolic abnormalities characteristic of the metabolic syndrome.⁵⁰⁻⁵² Recent evidence suggests that both adult and childhood survivors of cancer are at risk for metabolic abnormalities,^{51,53,54} such as hyperinsulinemia and hypercholesterolemia, with high levels of low-density lipoprotein and low levels of high-density lipoprotein.⁵¹ Survivors of childhood and adult cancers have reduced aerobic capacity, decreased strength and flexibility, and increased fatigue.^{55,56}

Results from studies regarding general psychosocial adjustment to cancer survivorship have been equivocal (reviewed by Dolgin et al⁵⁷). While several studies found little impact or in fact better psychological health in long-term survivors,^{58,59} others found increased frequency of anxiety, symptoms of depression, anger, tension, confusion, and alcoholism (reviewed in Richardson et al⁶⁰). In a recently completed study at our own institution,⁶¹ we found that most survivors of pediatric sarcomas (mean years since diagnoses = 18) scored in the clinical range of the Brief Symptom Inventory and that 12% met diagnostic criteria for posttraumatic stress disorder.

A number of clinical studies have reported on the benefit of more traditional exercise in cancer patients,⁶² in which exercise has been shown to improve aerobic capacity^{49,48} and strength and flexibility.^{48,63,64} Exercise has been recommended as an approach to enhancing QOL in cancer survivors.⁶⁵ Following breast cancer treatment, exercise is shown to improve walking distance⁶⁶ along with overall physical functioning.⁶⁷ Resistance exercise is shown to reduce fatigue as well as improve upper and lower body muscular fitness in prostate cancer patients receiving androgen deprivation therapy.⁶⁸ Exercise programs have also been shown to enhance QOL in long-term follow-up of breast cancer survivors⁶⁹ and multiple myeloma survivors,⁷⁰ and they have been suggested to improve the QOL for survivors of other cancers.⁶⁵

Regular exercise has a positive effect on the physiological and psychological functioning of cancer patients.⁶² Interestingly, exercise has also been shown to produce added benefit for cancer survivors when coupled with a group psychosocial intervention, compared to psychotherapy alone.⁷¹

To date, only 2 studies have examined TCC practice in cancer survivors. Mustian et al⁷² randomized 29 breast cancer survivors to receive training in TCC or psychosocial support. In this preliminary report, the TCC group demonstrated an improvement in health-related QOL, while the psychosocial intervention group demonstrated declines in measures of QOL.⁷² In a more recent examination (also a preliminary report) with an identical study design, the TCC group showed significant improvements in functional capacity compared to the psychosocial support therapy group which, again, demonstrated marked declines.⁷³ These results need to be confirmed in larger studies enrolling a more diverse survivor population and including proper controls, as neither study used a nonexercise or wait-list control.

Study Rationale

TCC may provide benefit for a wide range of patient populations. As TCC is associated with a reduction in

psychological stress as well as a spectrum of health benefits, TCC may affect QOL, psychological stress, and other health outcomes in cancer survivors.

There is a need to design clinical studies that both allow the examination of complex mind-body interventions and extend the knowledge of the effect of mind-body practices to different patient populations.

Cancer survivors, who carry an increased long-term risk of overall morbidity and reduced well-being due to treatment-related psychological sequelae⁶¹ as well as persistent physical impairment and deconditioning, may particularly benefit from an intervention such as TCC.

Designing a Study of TCC in Cancer Survivors

To study the effect of TCC in a population with multiple and diverse needs, such as cancer survivors, a study has been initiated at the National Center for Complementary and Alternative Medicine, National Institutes of Health, to compare the benefit of TCC to aerobic exercise in this population. The main study aims are to compare TCC to aerobic exercise in the areas of

- reduction of psychological stress,
- improvement of physical functioning and fitness, and
- improvement of overall QOL and well-being.

Study Design

Participants eligible for this study are adult survivors of a solid cancer with good performance status and without a history of cardiovascular disease or stroke. In addition, they completed cancer therapy including chemotherapy or biologic therapy more than 2 years ago and have remained free of recurrence at the time of study enrollment.

In a prospective, randomized, wait-list–controlled, 12-week intervention study, TCC and an aerobic exercise regimen were compared to a wait-list control group and followed prospectively for study outcomes at baseline, 6 weeks, and 12 weeks.

Exercise Interventions

The TCC group of the study will learn and practice the 24-posture standardized TCC.^{2,74} This 24-posture standardized TCC was compiled in 1956 based on the foundation of yang style,⁷⁴ which was simplified from a more complicated 108 form. Meta-analysis has suggested that the yang style yields the greatest aerobic benefit.⁷ In a recent review of 39 studies looking at TCC in chronic conditions, Wang cited simplified versions of the yang style (which include fewer forms) to have been employed 14 times.³⁴ It should

also be noted that in this review, 16 studies did not report on the style of TCC used. The lack of reporting the TCC form has been cited in other reviews,⁷⁵ in which only half of the studies examined mentioned the style of TCC intervention.

A TCC master will administer all training sessions. Each session will include warm-up exercises, TCC practice, and cool-down exercises. Study participants' attendance for each attended session will be logged by the TCC master, and the total number of sessions attended over the total number of sessions held within the 12-week study period will be recorded for each study participant.

The exercise program will consist of an aerobic exercise class using an ergometer (stationary bike). The program will be offered and supervised by qualified trainers credentialed for working with clinical study participants. Study subjects will be requested not to start practicing TCC or start/change their physical exercise routine during the study period.

In the current study, both the TCC instructor and rehabilitation instructor will log each participant's attendance to each class, and practice of either exercise regimen outside of class will be discouraged. While TCC regimens may enjoy better adherence than an aerobic exercise program,⁷⁶ recording patient adherence has been overlooked in many prior studies. In the 20 studies reviewed in Table 1, only 11 mentioned how often patients missed classes, and only 3 reported on the instructions participants were given on physical activity outside of class. Monitoring adherence is important to estimate a dose effect of tested study interventions.

Outcome Measures

Outcome measures are grouped in 3 areas according to the study hypotheses: measures of psychological variables, QOL/well-being, and physical functioning/fitness. Participants will complete a number of questionnaires and physical tests at baseline, 6 weeks, and upon study completion. A large portion of these outcomes will be psychological measures, emphasizing the evaluation of stress reduction and positive psychological gain.

Positive Gain

When examining psychological outcomes, prior TCC studies have primarily concentrated on the alleviation of negative emotions (stress reduction, depression, etc) as outcome variables.¹⁵ This focus mirrors most research relating to psychological variables and health outcomes. For example, depressive symptomatology^{77,78} and a number of negative psychosocial variables^{79,80} are correlated with cardiovascular risk and

mortality due to cardiovascular disease. Hostility is associated with elevated blood pressure,⁸¹ and early hostility expression has predicted depression, cigarette smoking, and increased alcohol consumption up to 30 years later.⁸² Long-term psychological distress also demonstrates suppressed immune function.⁸³

On the other hand, recent work has highlighted that the promotion of positive emotions may not necessarily lie on the same continuum as the pathology resulting from negative emotions.⁸⁴⁻⁸⁶ The examination of positive emotions and health benefit, or the other "hemisphere" of behavioral medicine,⁸⁴ has only recently become an area of focus. Positive well-being has been distinguished as an independent construct from negative emotional states in recent measurements of QOL⁸⁶ and measurement of positive affect and coping.⁸⁵ This view has also been supported by the burgeoning field of psychoneuroimmunology, which has identified biological correlates of psychological well-being as separate from negative mental states that have previously received attention.⁸⁷⁻⁸⁹

In measuring psychological outcomes, mind-body interventions such as TCC may be grouped with interventions such as stress management and meditation that enhance coping skills⁸⁵ and challenge practitioners to find meaning from their stressful experiences. One such intervention, mindfulness-based stress reduction, has been shown to increase levels of empathy and number of spiritual experiences over an 8-week course in medical students compared to a wait-list control.⁹⁰ However, there is a paucity of studies across the mind-body intervention literature examining positive psychological gain.

Conclusion

TCC is a widely practiced movement exercise combining characteristics of meditative practice and aerobic exercise. Cancer survivors may benefit most from a mind-body intervention such as TCC. While studies previously have compared changes of physiologic parameters comparing TCC and aerobic exercise, representing the "body" aspect of TCC, studies are lacking that may demonstrate differential effects of a mind-and-body activity compared to aerobic exercise programs.

As the concept of the human being as a mental-spiritual-physical entity is widely held and fundamental to many systems and practices of complementary and alternative medicine (CAM), there is a need to establish ways of investigating the mind and body effects, as well as their benefits for disease and well-being, of practices such as TCC. A review of published randomized trials of TCC suggests benefits in the elderly and in cardiovascular diseases.

Research of TCC in other populations that may benefit from mind-body interventions such as cancer survivors has been limited. In addition, testing mind-body interventions not only for disease risk reduction or prevention of morbidity, but also for positive gain over individual baseline offers a valuable perspective on widening our understanding of mind-body practices. Cancer survivors have multiple and complex health needs as a result of both the diagnosis with a life-threatening disease and the often highly stressful, demanding, and at times toxic therapies cancer patients undergo to achieve cure from the disease, leading to the risk of a range of late effects from treatment. CAM approaches are widely used by cancer patients to reduce symptoms and improve coping with disease- and treatment-related symptoms, while research on the use and benefit of CAM for cancer survivors has been limited. In this article, the authors propose a study as a model of how to further the understanding of the effects of a mind-body practice and to test the possibility of increased benefit of TCC as a complex mind-body intervention in cancer survivors.

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