

**Therapeutic benefits of tai chi/qigong: An overview and critical review.
*January 1990 through January 2010***

Authors: Klein PJ,¹ van Hooydonk K,¹ Kutlesa M¹
¹D'Youville College, Buffalo, NY

About the Authors:

Dr. Klein is a professor of Physical Therapy at D'Youville College.
(kleinpj@chitime.info)

Mr. Kutlesa and Ms. van Hooydonk contributed to this research in partial fulfillment of requirements for their Clinical Doctor of Physical Therapy Degree awarded from D'Youville College.

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NOTES:

This article is offered through e-publication as public access for the advancement of Tai chi/Qigong. Our only request in dissemination is that the contributions of the authors be acknowledged.

Preliminary results of this research were reported in a poster presentation at the International Tai Chi Chuan Symposium, Nashville TN, July 5-9, 2009.

Finally, our apologies for any important published research that was inadvertently excluded from this review.

ABSTRACT

Background There is rising interest in therapeutic use of Tai chi/Qigong as complementary or alternative to modern Western Medicine in a number of clinical areas. This interest generates questions regarding the strength and breadth of supporting research evidence. **Purpose** To identify and systematically review the current research on therapeutic effects of Tai chi/Qigong practice, Jan 1990 through Jan 2010. **Methods** Published reports of controlled clinical trials and systematic reviews were identified through a search of electronic databases including PUBMED, CINAHL, SPORTDISCUS, Cochrane Library, and AMED using the key words: taiji, tai chi, chi kung and qigong. Additional titles were identified through review of reference lists. Only primary clinical studies (Level I or II) meeting a standard of methodological rigor (a score of ≥ 5 on the Physiotherapy Evidence Database (PEDro) scale) were included. **Results.** Eighty-nine controlled clinical trials (Level I & II) met the inclusion standard. The body of evidence has quadrupled over the past 6 years. The most often researched and strongest evidence of effect are in the combined area of balance/falls/fear of falling. Strong evidence of effect also exists for cardiopulmonary function, quality of life, stress management, bone and joint health, and deleterious effects of aging. There is some supporting research validating positive effect with regard to immune response, pain management, sleep quality and stress reduction as well as evidence of minimization of functional disability associated with cancer and arthritis. Whereas conflicted evidence exists in management of Diabetes and Parkinson's disease. There is no evidence of adverse effects. Due to the heterogeneity of studies, no pooled meta-analyses were performed. **Conclusions** While additional evidence is needed in under-researched areas, there is sufficient evidence to justify investment in development and delivery of Tai chi/Qigong programming on a wide-scale basis in clinical areas where strong evidence of health benefit exist. Given the rapid growth in emerging research, those interested in keeping current with the state of knowledge and 'best practices' are advised to maintain continuing surveillance of emerging research.

Tai chi, Qigong, exercise, Evidence-based

INTRODUCTION

There is rising interest in the health-promoting benefits of the ancient exercise arts of Tai chi and Qigong among both the public and the health care industry sectors.¹⁻⁹ Tai chi quan (also known as 'taiji chuan' or shortened to 'tai chi') is a subtle martial art rooted in Daoist philosophy.¹⁰ When Tai chi is performed for health, it is a form of Qigong. The collective term 'Tai chi/Qigong' is used to represent this type of practice.¹¹ While Tai chi and Qigong are similar, they are not synonymous.¹² Tai chi is a slow, flowing exercise often practiced as empty-hand or weapon forms, or paired practice known as push hands.⁸ 'Qi' means life energy. 'Gong' means dedicated practice.^{13,14} Qigong is energy cultivation through exercise, meditation, breath control and self-massage with origins in Chinese medicine.⁸ While both arts are ancient in Eastern culture, they are relatively new to the Western world. Growing interest within Western health care in these arts is due in great part to a shift in that industry from primarily reductionist curative care toward preventative medicine and health promotion.¹⁵ Emerging research validating the efficacy of Tai chi and Qigong practice for health promotion and management of chronic illness has spurred interest from health professionals.^{8,16}

A pivotal factor in Western advancement of Tai chi/Qigong is the consensus work conducted jointly by researchers from the University of Illinois and the Institute of Integral Qigong and Tai Chi. This group undertook to assemble a meeting of Tai chi/Qigong experts and researchers. Goals of that meeting were to establish a consensus on what elements of Tai chi/Qigong practice might be essential in 'best practices' and to generate a framework for evidence-based Tai chi/Qigong programming.¹⁷ This body identified essential components of these exercise arts as dynamic movement, static standing and sitting postures, breathing regulation, meditation and self-administered massage.⁸ Challenges and recommendations for how to train a sufficient number of qualified instructors to provide wide access for community programming were discussed and summarized in a public report of that meeting.⁸ Since that time, public awareness has been raised by ensuing articles appearing in health consumer media such as the Harvard *Women's Health Watch*.

Tai chi is often described as "meditation in motion," but it might well be called "meditation in motion." There is growing evidence that this mind-body practice, which originated in China as a martial art, has value in treating or preventing many health problems. And you can get started even if you aren't in top shape or the best of health.

[Harvard Women's Health Watch, May 2009]⁹

As part of the integration of Tai chi and moving Qigong as health-promoting modalities, questions regarding the validity of health claims for general health benefits and clinical applications as well as questions specific to exercise prescription for mode, frequency, and duration have been raised.⁸ The current report was generated in response to these information needs. It should serve as a resource for health and wellness and rehabilitation professionals, health care planners and policy makers and the public regarding the current state of research knowledge regarding the focus and strength of research evidence evaluating therapeutic use of Tai chi/Qigong as a health-promoting modality.

BACKGROUND

Published reports of the potential therapeutic benefits of Tai chi/Qigong began to appear in Western health care literature in the 1980's. One of the earliest reports was a self-report case study by Koh on potential use in management of ankylosing spondylitis.¹⁸ Theoretical discussion and empirical descriptive reports of potential clinical uses increased in the literature over the next 30 years. The establishment of the National Center for Complementary and Alternative Medicine (NCCAM) of the United States National Institute of Health (NIH) and dedication of research dollars resulted in funding of more rigorous study.^{19, 20} One of the first of which was the well-known study out of Emory University Medical Center conducted by Juncos and colleagues providing supporting evidence of the potential of tai chi/qigong practice in balance training fall prevention.²¹ The following briefly provides a chronological summary of the emerging body of critical review research in this area.

The first critical reviews of modern research evidence appeared as we entered the 21st century. In 2004, a comprehensive review by Wang et al was published. This critical review addressed effectiveness of Tai chi in management of chronic conditions.²² The review included 47 studies: 9 randomized controlled trials, 23 non-randomized controlled studies, and 15 observational studies. These authors found weak to moderate evidence of benefits in balance and strength, cardiovascular and respiratory function, flexibility, immune system, symptoms of arthritis, muscular strength, and psychological effects. In that same year, a review article by Klein and Adams on comprehensive effects of tai chi was published. These authors included 17 controlled clinical research studies. Similar to the conclusions of Wang and colleagues, these researchers reported that no strong body evidence existed in any singular clinical area of application. However, evidence did exist a wide range of clinical areas suggesting comprehensiveness of effect.²³ Both reviews stated that more research was needed, adding that future research should also address theory validation as to mechanism of effect.

Independent from the critical reviews conducted in the United States, Kuramoto, a Japanese researcher, reviewed research published from 1996 through 2004 concentrating on research addressing effects of Tai chi exercise on the health and well being of older adults.²⁴ Validating previous work, Kuramoto reported that Tai chi practice may assist in management of arthritic pain, decrease fear of falling, increase muscular strength, physical function, cardiopulmonary function, flexibility, and balance as well as enhance psychological well being and improve sleep quality. The following areas were identified for further research: the immune system, bone mineral density, arthritis and suggested examining outcomes of various instructional methods, various Tai chi styles, various diagnostics, and various ages would be helpful in displaying the effectiveness of Tai chi.

In addition to the research described in the preceding, a 2008 text,¹⁰ edited by Hong, compiled international research. That text represents much of the research and state of the art knowledge on evidence-based practice available through 2007.

The term 'Qigong' appeared in Western health literature concurrent with interest in Tai chi.²⁵ In 2004, Kemp and colleagues conducted a systematic review of the research examining Qigong as a therapeutic intervention for use with older adults.²⁶ This review concluded that Qigong had potential therapeutic value for older adults emphasizing the mind-body connection and quality of life effect potential. The fact that it is easier to learn than standardized Tai Chi

forms and can more easily accommodate individuals with movement or activity limitations adds to its potential utility.

The most recent comprehensive review included in this review was published in March 2009. In that review, Rogers, Larkey and Keller identified and critiqued 36 high quality RCT's investigating the health effects of Tai chi/Qigong practice among older adults.²⁶ Expanding findings of previously published critical reviews, they concluded that significant improvement in clusters of similar outcomes indicated interventions utilizing Tai chi and Qigong may help older adults improve physical function and reduce blood pressure, fall risk, and depression and anxiety. These researchers also provided valuable information on frequency of use of outcome measures. Balance was assessed within 16 studies with 8 of these studies utilizing the one-leg stance test. Six studies out of the 11 studies assessing physical function used timed walk tests, such as the 6-min and the 50-ft. walk test. Cardiopulmonary effects were examined in 9 studies. Five of the 9 studies examined blood pressure, and 2 studies used the 6-min walk test as a functional measure of cardiovascular endurance.

Several clinically-specific literature reviews have been published. (See Table 1. for a synopsis of these reviews) The reader will note how the earliest reviews share conclusions of "insufficient evidence". However in clinical areas where the body and rigor of research has expanded over recent years, statements of validation begin appearing with regularity. The phenomenon of the rapid growth of research in this area over the past 5 years demonstrates clearly how important it is that clinical and policy decisions be derived from current rather than dated information or low quality research.

Table 1.

Summary of systematic reviews discussing population specific therapeutic benefits of Tai chi/Qigong from 2000-2009 organized by clinical area/population.

<i>Author</i>	<i>Population</i>	<i>Design/ (#) Studies</i>	<i>Conclusion</i>
<i>Balance/Falls</i>			
Chan WW et al (2000) ²⁸	Balance	RCT's/ CCT's/ Case Series (7)	Moderate research evidence supporting the use of TC to improve balance and postural control as measured by responses to internal perturbations
Wu G et al (2002) ²⁹	Balance Fall prevention	Longitudinal Cross-sectional Non-randomized (16)	Scattered evidence to support the positive effects of Tai Chi on postural balance and fall prevention. Limitations include small # of subjects, variations in type and duration of Tai Chi and outcome measures.

Table continued

Komagata S et al (2003) ³⁰	Balance	RCT's and Qualitative Studies (11)	Moderate evidence of the effectiveness on balance improvement. Shows progression in depression, quality of life and balance. Findings should be interpreted with caution due to the small number of participants.
Wayne PM et al (2004) ³¹	Older adults Balance Well being	RCT's/CCT's/ case-control studies/ case series (24)	Tai chi practiced independently, or in combination with other therapies, can reduce risk of falls, including improved balance and dynamic stability, increased strength and flexibility, improved performance of activities of daily living (ADLs), reduced fear of falling, and improvement in psychological well-being. Limited data exists to support Tai Chi for peripheral vestibulopathy
Verhagen AP et al (2004) ³²	Older adults Falls Blood pressure	Experimental Design (7)	Limited evidence that TC is effective in reducing falls and blood pressure in the elderly. Intensity of intervention varied from 1 hr weekly for 10 wk to 1 hr every morning for 1 yr. A study assessing falls reported a beneficial effect of 47% in the TC group, but most study conclusions were based on a pre-post analysis rather than controlled study.
Harmer P et al (2008) ³³	Fall prevention	RCT's (9)	Significant improvement in fall-related outcomes. Impact on falls-related outcomes is uncertain. Variance in study settings, subject characteristics, sample size, type of Tai Chi intervention, length of intervention and quality of the study design.
Harling et al (2008) ³⁴	Fear of Falling	RCTs (7)	Strong evidence to support the effectiveness of Tai Chi in reducing fear of falling Weak evidence supporting its effectiveness in reducing the incidence of falls in older adults Duration, frequency and intensity of the Tai Chi interventions showed great variation
<i>Bone Mineral Density</i>			
Wayne PM et al(2007) ³⁵	Bone Mineral Density (BMD)	RCT's, CCT's, Cross-sectional (6)	Impact of Tai Chi on BMD is limited by the quantity and quality of research May be an effective, safe, and practical intervention for maintaining BMD in postmenopausal women. Impacts other risk factors associated with low BMD (e.g., reduced fall frequency, increased musculoskeletal strength)

Table continued

<i>Cardiopulmonary</i>			
Li JX et al (2001) ³⁶	Cardio-respiratory Function	cross-sectional longitudinal studies (9)	Effective in cardiorespiratory function, immune capacity, mental control, flexibility, and balance control. Can improve muscle strength and reduces the risk of falls in older adults. Showed a considerable decreased ventilatory equivalent (VE/VO ₂ MAX) when compared with other types of physical activity.
Taylor-Piliae, RE, et al., (2008) ³⁷	Older Adults With Heart disease	Cross-sectional/ Experimental (14)	Increases aerobic capacity when practiced long term. Recommended as an alternate aerobic exercise, especially sedentary adults > or =55 years old.
Thornton, E.,(2008) ³⁸	Cardio-respiratory Function	RCT's	Data supports reduction of systolic or diastolic blood pressure (BP), but current data are unclear to the cause of changes in BP Lack of research in analyzing the relationships between BP change self-efficacy, and differences between single outcomes.
Yeh GY (2009) ³⁹	Cardio-vascular	CCT's (29)	Suggests beneficial as an adjunct therapy. 6 out of 9 RCTs of adequate quality Most studies showed benefit in blood pressure and exercise improvement
Lee MS et al 2009 ⁴⁰	Aerobic Capacity	RCT's (5)	Tai chi was not shown to be superior to physical exercise. Existing evidence does not show that tai chi is effective in improving aerobic capacity.
<i>Cancer</i>			
Mansky P et al (2006) ⁴¹	Cancer survivors	RCT's CCT's (11)	May provide benefit to cancer survivors based on its characteristics of integration of meditation and aerobic exercise together. Studies of Tai chi (TC) in the elderly and 2 studies of TC for cardiovascular disease had adequate designs and size to allow conclusions about the efficacy of TC. Studies were small and provided only limited information on the benefit of TC in the settings tested.
Lee MS et al (2007) ⁴²	Breast Cancer	RCT's (2) CCT's (2)	Does not suggest that tai chi is an effective supportive treatment for cancer. Methodological problems with studies: small sample size, inadequate study design and poor reporting compliance.

Table continued

<i>Hypertension</i>			
Lee MS et al (2007) ⁴³	Hypertension	RCT's (7)	Beneficial effects in support of qigong Reduction in systolic blood pressure. Results in at least some of the relevant outcome measures
<i>Mind Body Interventions: Attention to Dose, Tai Chi</i>			
Sannes TS et al(2008) ⁴⁴	<i>Attention to Dose</i>	RCT's (19)	Further research needed to determine an appropriate dose of Tai Chi (TCC) training. Inconsistency in reporting of attendance and home-based practice rates, made it difficult to speculate on the relationship between the amount of TCC and intervention effects.
<i>Pain</i>			
Hall A et al (2009) ⁴⁵	Pain	RCT's (7)	Small positive effect on pain and disability in people with arthritis. Data limited and low quality
<i>Parkinson's disease</i>			
Lee MS et al (2008) ⁴⁶	Parkinson's Disease (PD)	clinical studies (7)	Evidence is insufficient to suggest that Tai Chi is an effective intervention for PD. Insufficient research due to small sample sizes, inadequate study design, results not reported well and inadequate peer review for publication.
<i>Rheumatoid Arthritis</i>			
Han A et al (2004) ⁴⁷	Rheumatoid Arthritis	RCT (1) CCT (1)	Statistically significant benefits on lower extremity range of motion, especially ankle range of motion, for people with Rheumatoid Arthritis (RA). Clinically important or statistically significant effect on most outcomes of disease activity is not evident. Does not worsen symptoms of rheumatoid arthritis.
Lee MS et al (2007) ⁴⁸	Rheumatoid Arthritis (RA)	RCT's (2) CCT's (3)	Insufficient evidence as to whether that Tai chi is an effective treatment for RA. Few trials testing the effectiveness of tai chi in the handling of Rheumatoid Arthritis (RA) and the studies available are of low quality.

PURPOSE

The current critical review was undertaken as a broad overview of topic-relevant research and is time-dated from January 1990 to January 2010. It is further limited to reports of studies available as full text in English language.

Research questions included:

1. How has the research grown over the past 30 years?
2. How global is the research interest?
3. What clinical areas are being investigated?
4. What is the strength of evidence in specific clinical areas under study?
5. Is there any standardization in operational definition of the form or mode of Tai chi/Qigong being studied?
6. What recommendations can be made regarding applications and future research?

METHODS

A search of research published from January 1990 through January 2010 was conducted. Controlled clinical trials and systematic reviews were identified through search of electronic data bases including PUBMED, CINAHL, SPORTDISCUS, Cochrane Library, and AMED using the key words: taiji, tai chi, and qigong. Additional titles were identified through review of reference lists. Literature search and critical review conducted by three trained raters. Study selection and critical review were conducted in a sequential four-step process:

1. rating of level of evidence by research design,
2. determination of intervention relevance,
3. rating of methodologic quality, and
4. analysis of strength of body of evidence within specific clinical areas.

Intervention validity for study inclusion was based on whether the primary intervention consisted of some form of moving exercise which might constitute either Tai chi or moving Qigong practice as defined within the consensus report generated out of a 2005 National Qigong and Tai Chi Meeting, University of Illinois Urbana-Champaign.⁸

Level of evidence was determined using the hierarchy of evidence classification system originated by Sackett and colleagues published in its current form by the Oxford Centre for Evidence Based Medicine and available at <http://www.cebm.net>.⁵⁰ Methodologic quality was rated using the Physiotherapy Evidence Database [PEDro] scale.⁵¹ A minimum rating score of 5/11 was required for study inclusion in the summary research analysis. Rating considered; randomization, explicit eligibility criteria, concealment of treatment allocation, homogeneity between groups, blinding, intention to treat analysis, reporting of measures of variability, and consideration of attrition and its likelihood to cause bias. In order to assess strength of a body of evidence, research was categorized by clinical area based on target population of the study.

Strength of evidence within a defined clinical area was qualitatively judged on methodological quality, quantity, and consistency of available research using a rating system

adopted from Gross et al.⁵² (See Table 2. for categories and standards) Given the heterogeneity of study populations and outcomes measures, no quantitative meta-analyses were performed.

Table 2.

Categories and Standards for judging the strength of a body of evidence.

<i>Strength level</i>	<i>Standard</i>
Strong	consistent findings in multiple high quality RCT's
Moderate	findings in a single, high quality RCT or consistent findings in multiple low-quality trials.
Limited	a single low-quality RCT
Conflicted	inconsistent results in multiple RCT's
No Evidence	no studies were identified
Evidence of Adverse Effect	trials showed lasting negative changes

RCT = randomized controlled clinical trial
CCT = case controlled trial

Adopted from 'Manipulation and mobilisation for mechanical neck disorders' (Cochrane Review). Reviewers: Gross A; Hoving JL; Haines T; Goldsmith CH; Kay TM; Aker P; Brønfort G. Review Group: Cochrane Back Group; Cochrane Database of Systematic Reviews; Edited/Substantively amended: 26 June 2008 (AN: CD004249)

RESULTS

The current search identified 278 topic-related clinical studies. Eighty-nine (70 RCT's and 19 CCT's) met the inclusion criteria of prospective controlled clinical study, with Tai chi/Qigong used as the primary intervention, and meeting a standard of methodological quality. (See Figure 1. Consort Flow diagram) An exponential growth in controlled, Level I and II, studies has occurred. From 1990 to 1994 only 1 quality study was identified. In the period from 2006 to through January 2010, fifty-five controlled studies were identified. (See Figure 2.) The global distribution of research indicates that a significant proportion of the body of evidence reviewed emerged from the United States (43%) with 25% from Asia, 21% originating from Europe, and 8% from Australia and New Zealand. (See Figure 3. Global distribution of Research)

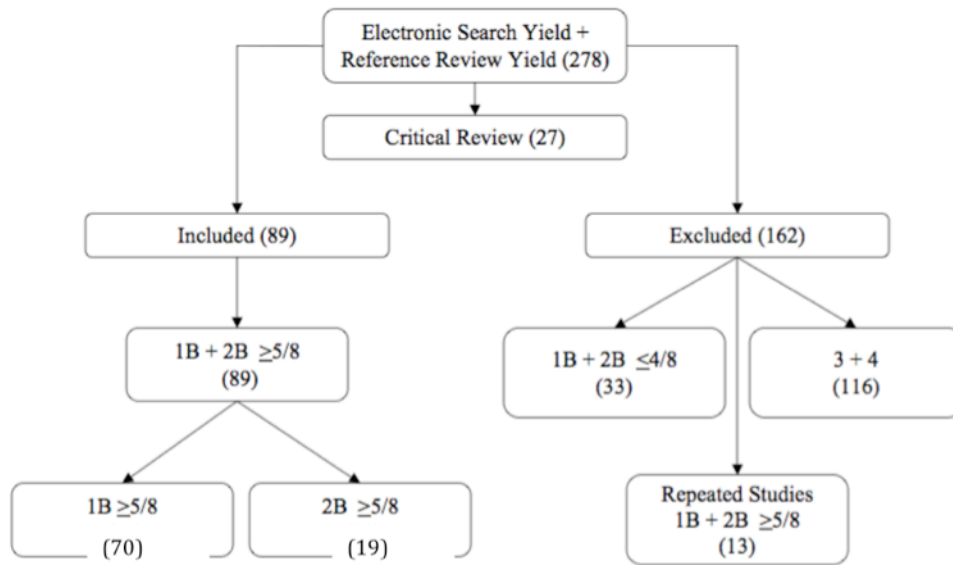


Figure 1. Consort Flow diagram

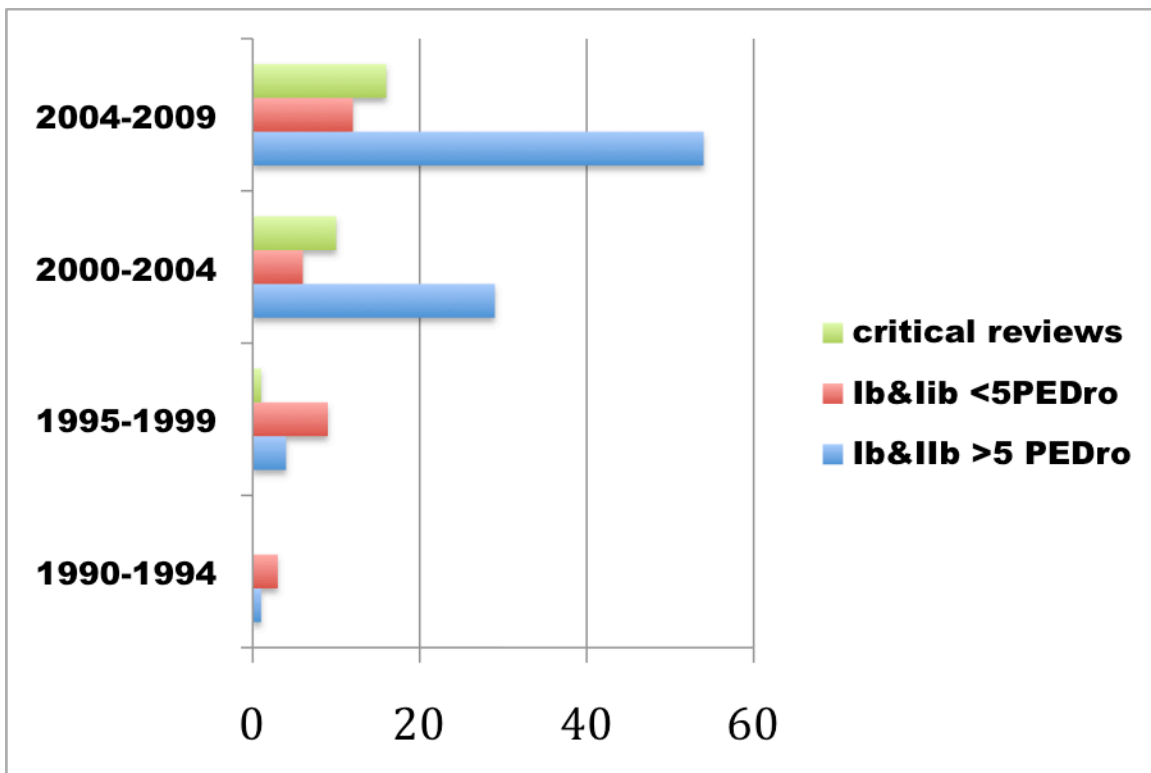


Figure 2. Number of published studies (Level Ib, Iib or critical reviews) over time 1990-2009.

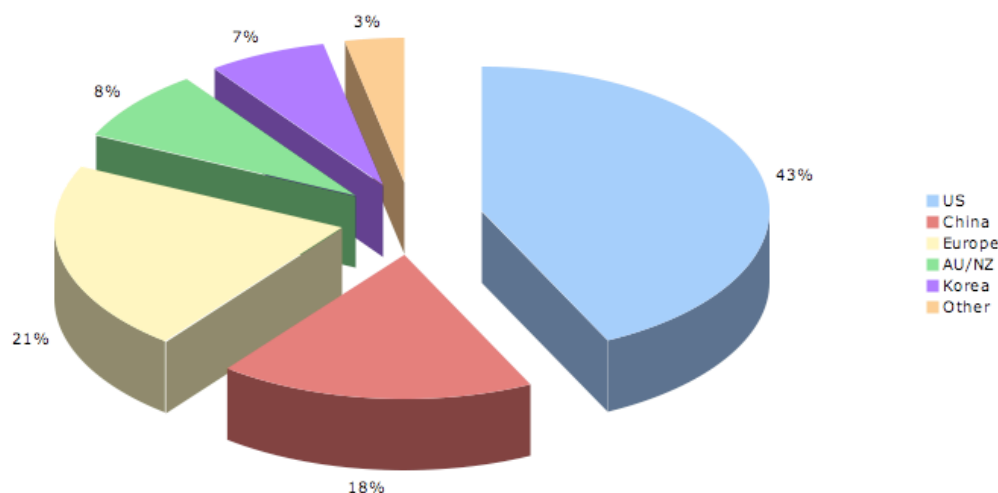


Figure 3. Geographic distribution of research. More than 2/5th of the studies reviewed originated from the U.S.

Within the body of research selected for critical review, a total of 7701 subjects were studied. While age ranges from children through older adults, the majority, 76% of the studies, targeted older adults ages 50 to 80 years. Target populations and clinical areas included Aging, Ankylosing Spondylitis, Arthritis, Balance, Bone Health, Brain Injury, Cancer, Cardiopulmonary, Cerebral vascular accident (CVA), Depression, Diabetes, Dual Task, Elderly/Falls, Endocrine, Falls, Fear of Falling, Fibromyalgia, Immune, Osteoarthritis (OA), Pain, Parkinson's, Quality of life (QOL), Children with attention deficit, Self Efficacy, Sleep, Stress, Weight loss, Other (biomechanical changes). Interventions included training in choreographed forms from Yang, Sun, and Chen styles, Qigong, and combination forms such as Chi + Qigong and Sun + Yang styles. Lotus, NG and researcher-defined Tai Chi/Qigong were also studied. The most frequent mode of training was instructor-led group classes. Approximately 1/5th of the studies specified use of at-home practice as part of the intervention condition. Duration of training/practice ranged from one session to over 1 year. However, durations of 5 to 12 weeks were used in approximately half of the trials, and durations of 13 to 24 weeks were reported in 25% of the trials.

Quality of instruction also varied. For purposes of categorization in the current review, 'expert' instruction was operationally-defined as instruction provided by experienced instructors or masters, certified tai chi chuan (TCC) instructors, TC trained physical therapists, or as augmented instruction from video demonstration of experienced tai chi instructors. Non-expert instruction included supervised instruction by exercise physiologists, researchers, physical therapists, and physicians. Using this qualified definition, 'Expert' instruction was indicated in

62% of the research. Twenty-seven percent of the studies did not provide clear descriptions regarding the instructor expertise, and 11% reported ‘non-expert’ instruction.

The following summarizes magnitude and consistency of evidence of positive effect in aggregate by clinical area. In total, 89% of the controlled studies reported positive effect. The combined category of balance/falls/fear of falling was the application most frequently investigated. Clinical applications with at least three supporting quality studies included: Balance/Falls/Fear of falling, Cardiopulmonary, Immune, OA, Pain and Stress. Two supporting studies met methodological rigor standards in the following areas: Arthritis, Brain injury, CVA and Sleep. Areas with limited evidence (only one low quality RCT or CCT study) included Ankylosing Spondylitis, Depression, Attention deficit, Self-efficacy and other (biochemical changes). Clinical areas needing more research where conflicting evidence exists includes Diabetes, Parkinson’s, Fibromyalgia, and weight loss. (See Table 3.)

Table 3.

Distribution of research evidence within clinical application categories by effect: Effect ‘YES’ or Effect ‘NO’ (Study references are indicted in superscript.)

	# of studies	Effect YES	Effect NO
Strong Evidence (consistent findings in multiple high quality RCT’s)			
Balance/Falls/Fear of Falling	17	16 ^{78-87/110-115}	1 ⁸⁸
CardioPulm	13	13 ⁵³⁻⁶⁵	-
QOL	6	5 ⁶⁶⁻⁷⁰	1 ⁷¹
Bone Health	6	6 ⁷²⁻⁷⁷	-
Aging	5	4 ⁸⁹⁻⁹²	1 ⁹³
Stress	3	3 ⁹⁸⁻¹⁰⁰	-
Pain	3	3 ¹⁰¹⁻³	-
OA	3	3 ¹⁰⁴⁻⁶	-
Immune	4	4 ^{107-9, 129}	-
Moderate Evidence (findings in a single, high quality RCT or consistent findings in multiple low-quality trials.)			
Cancer	3	3 ¹¹⁶⁻¹⁸	-
CVA	2	2 ¹¹⁹⁻²⁰	-
Sleep	2	2 ¹²¹⁻²	-
Brain Injury	2	2 ¹²³⁻⁴	-
Arthritis	2	2 ¹²⁵⁻⁶	-
Limited Evidence (a single low-quality RCT)			
Ankylosing Spondylitis	1	1 ¹²⁷	0
Depression	1	1 ¹²⁸	0
Attention deficit (school-based)	1	1 ¹³⁰	0
Self Efficacy	1	1 ¹³¹	0

Table continued

Other (biochemical changes)	1	1 ¹³²	0
Conflicting Evidence (inconsistent results in multiple RCT's)			
Diabetes	4	3 ⁹⁴⁻⁶	1 ⁹⁷
Fibromyalgia	3	1 ¹³³	2 ¹³⁴⁻⁵
Parkinson's	3	1 ¹³⁶	2 ¹³⁷⁻⁸
Weight loss	2	1 ¹³⁹	1 ¹⁴⁰
Insufficient Evidence			
Dual Task (cognition)	1	-	1 ¹⁴¹

CONCLUSIONS/DISCUSSION

The current review of the existing body of research investigating the therapeutic effects of Tai chi/Qigong revealed global interest and exponential growth in number and quality of studies and range of clinical applications. While 20 years ago it may have been considered strange in many parts of the Western world to see groups of individuals practicing Tai chi in our parks, today this scene is common place. The most often researched and strongest evidence of effect are in the areas of balance/falls/fear of falling, cardiopulmonary function, quality of life, bone and joint health, and deleterious effects of aging. There is supporting research suggesting positive effect with regard to immune response, pain management, sleep quality and stress reduction as well as minimization of functional disability associated with cancer and arthritis.

The reader is cautioned that these conclusions are time-dated to Jan 2010 and limited to articles with full text available in English language describing original clinical research. New evidence continues to emerge making the challenge to both stay abreast of new research and critically analyze the value of new knowledge a daunting one. (See ADDENDUM for a sample of research published in the months succeeding the conclusion of this review.

In addition to insights into clinical applications, knowledge gained, emerging research has provided valuable information for the rational use of future research efforts. While the potential of the collective intervention known as Tai chi/Qigong appears high, additional research is still needed to further explore clinical areas where there has been insufficient or low quality study. Also, methodological design of future research is at issue. Recently, Rogers et al advocated that future research be designed using standardized tests and similar outcome measures to facilitate quantitative meta-analyses.²⁷ Tangential to design issues of choice of outcomes measurement, Wayne and Kaptchuk, of the Harvard Medical School Osher Research Center, offer the opinion that the study of such a complex and multi-component intervention as tai chi/qigong may be guided from use of the ecologic model. The ecologic model examines the interdependence of multiple factors rather than the reductionist controlled study of independent isolated effects.¹⁴² Further, they recommend a pluralistic methodological approach to clinical research that includes controlled randomized trials of fixed protocols, community-based pragmatic trials, cross-sectional studies of long-term practitioners, and studies that integrate qualitative methods.

Given that Tai chi and qigong are complex constructs rather than discreet operationally-defined interventions, the question of what constitutes therapeutic tai chi/Qigong remains unanswered. Tai chi and Qigong are ancient arts preserved within schools and evolved through centuries of legacy teaching. Among the studies reviewed, definition of intervention was at times indiscernible. In the instances where the interventions were described, it was evident that a number of different curricula and variations of similarly categorized curriculum were employed from study to study. These data did not lend themselves to any comparisons of which curricula or styles might be prescriptively superior and what dose is required to gain effect. It is the hope of the authors of the current review that, eventually, 'best practice' guidelines will emerge from integration of legacy teaching, clinical expertise and clinical research using theoretical foundations from both the belief system of Eastern energy cultivation and propositions of modern exercise science. This type of construct definition was introduced in the 2005 Consensus Report⁸ where essential elements of Tai chi/Qigong were proposed. In a similar theme, Wayne and Kaptchuk utilized whole research theoretical modeling to discuss what might be the essential elements of therapeutic Tai chi/Qigong. Their proposed model includes elements of guided physical activity, breathing regulation, mindfulness, mental imagery and intention, touch and subtle energy, psychosocial interactions, rituals and environment, and health beliefs.¹⁴³

Finally in the modern promotion of Tai chi/Qigong practice, questions of exercise prescription, curriculum, delivery, social marketing and professional education are just beginning to be investigated. Given the potential value of tai chi practice for population health, there is a recognized urgency for this type of information. How to provide wide-spread access to evidence-based programming is a recognized challenge. Very recently Wu et al (July 2010) concluded from controlled study that telecommunicated exercise programs could improve exercise compliance, fall reduction and balance and positive health outcomes.¹⁴⁴ This latest research suggests that telecommunications may play a role in achieving the goal of facilitating affordable and widely accessible Tai chi/Qigong practice.

SUMMARY

While additional evidence is needed in under-researched areas, there appears to be sufficient evidence to justify investment in development and delivery of Tai chi/Qigong programming on a wide-scale basis in clinical areas where strong research evidence of its health benefit exist. These include the clinical areas of balance/falls/fear of falling, cardiopulmonary function, quality of life, stress management, aging, bone and joint health, and immune response. In these areas, the research agenda has progressed from questions of clinical effect to questions of refined definition of modality, dissemination and social marketing strategies, funding, and professional education needs.

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ADDENDUM

The evolution and proliferation of clinical trials involving the practice of Tai Chi/Qigong is acknowledged to be ongoing. A review of the electronic database clinicaltrials.gov (accessed Sept 3, 2010), a service of the U. S. National Institutes of Health, found 43 registered studies under the terms 'tai chi', 'taiji', 'taijiquan' and 16 registered studies under the term 'qigong'. Six of the qigong studies were in progress as either active, recruiting or not yet recruiting. Foci of these studies includes neck or back pain, pre-surgical breast cancer, hospitalized older adults, fibromyalgia, and hypertension. Sixteen of the tai chi studies were in progress. Their foci includes arthritis, fibromyalgia, sleep, cancer survivors, older adults, cognition, immune response, heart function, stroke, peripheral neuropathy, and stress management. The following text briefly summarizes a sampling of the most recent clinical research available on the PUBMED (Accessed Aug 12, 2010)

Sampling of Recent Research *published in the recent months since this review was conducted.*

Song et al (March 2010) reported that tai chi practice among older women with osteoarthritis improved knee extensor muscle endurance and bone mineral density and lowered fear of falling during activities of daily living.¹⁴⁵

Lee et al (April 2010) concluded that the collective body of evidence does not show tai chi is effective for supportive breast cancer care; due to the lack of studies with high methodological rigor with a sufficient control intervention.¹⁴⁶

Wang et al (May 2010) following a review of 40 studies reported that evidences exists that Tai Chi assists in psychological well-being by decreasing stress, anxiety, depression and mood changes, and improved self-esteem. High-quality, well-controlled, randomized trials with an increased duration are needed to assist in making effective clinical decisions. The researchers concluded that long-term follow-up is needed in future studies for affirmation of the utilization of T'ai Chi in fall prevention and fracture related to fall prevention.¹⁴⁷

Chan et al (June 2010) reported that randomized controlled study of 200 individuals with COPD found that Tai chi/Qigong increased positive health outcomes in the patients' perception of their respiratory symptoms, showing an outcome of decreased disruption to their functional activities.¹⁴⁸

Taylor-Piliae et al (July 2010) reported results of a study which compared the effects of Tai Chi (TC, n = 37) and Western exercise (WE, n = 39) with an attention-control group (C, n = 56) on physical and cognitive functioning in healthy adults age 69 +/- 5.8 yr, in a 2-phase randomized trial. CONCLUSION: The TC and WE interventions resulted in differential improvements in physical functioning among generally healthy older adults. TC led to improvement in an indicator of cognitive functioning that was maintained through 12 mo.¹⁴⁹

Wang et al (Aug 2010) conducted a single-blind randomized controlled study to assess effects of Yang style tai chi as compared to a control intervention of stretching exercise and wellness education for individuals with fibromyalgia (N=66). Benefits were observed. No adverse effects were noted. The researchers concluded that tai chi may be useful treatment in management of fibromyalgia.¹⁵⁰

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