

**Table 1. Randomized Controlled Trials Testing Health Benefits of Qigong and Tai Chi**

Source	No. of Subjects / Mean Age Sex (Male/Female)	Exercise Duration (minutes x days per week)	Exercise Group	Control group	Reported Outcomes *P<.05
Audette Jin Newcomer Stein Duncan & Frontera, 2006  USA	27 Sedentary women  71.4 years  0/27	12 weeks (60 minutes x 3 days)	Tai Chi 10 movement Yang (n=11)	Brisk Walking (n=8); Usual Care (UC) later recruited and not randomized (n=8)	<u>Cardiopulmonary:</u>  VO <sub>2</sub> max ↑ in TC more than BW and UC*; heart rate variability, high frequency ↑ and low frequency ↓ in TC only* no between <u>Falls and Balance:</u> Strength, hand grip and knee extension ↑ TC only* and left knee extension ↑ in TC more than BW*; flexibility, only toe touch flexibility ↑ in TC more than BW*; and balance, only non-dominant one leg stance (OLS) with eyes closed ↑ in TC more than BW*
Barrow Bedford Ives O'Toole & Channer, 2007 UK	52 Older adults history chronic heart failure  69.5 years 42/10	16 weeks (55 minutes x 2 days)	TC with Chi Kung (n=25)	Usual Care (n=27)	<u>Cardiopulmonary:</u>  Incremental shuttle walk ↑ in TC more than UC ns <u>Patient Reported Outcomes:</u> Perceived symptoms of heart failure ↓ in TC more than UC* <u>Psychological:</u> Depression (SCL-90-R) ↓ in TC more than UC ns; anxiety ↓ in both groups ns
Brismee Paige Chyu Boatright Hagar McCaleb Quintela Feng Zu Shen 2007 USA	41 History of knee osteoarthritis 70 years  Jul-34	12 week TC and 6 week no training (40 minutes x 3 days /6 weeks group training and 6 weeks home training; and 6 weeks detraining)	TC Yang 24-form simplified (n=18)	6 weeks of Health Lecture followed by no activity same as exercise group (n=13)	<u>Physical Function:</u>  WOMAC ↑ in TC more than HL* with ↓ for detraining period <u>Patient Reported Outcomes:</u> Pain ↓ in TC more than HL*; adverse outcomes ns

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Burini Farabollini Ianucci, Rimatori Riccardi Capecci Provinciali & Ceravolo, 2006  Italy	26 History of Parkinson's disease  65 years  17-Sep	7 weeks each of Aerobics (45 min x 3 days) and Qigong (50 min x 3 days) 20 sessions each with 8 weeks between sessions	Qigong (QG) (n=11)	Aerobic Training (AT) sessions (n=11)	<u>Cardiopulmonary:</u>  6-minute walk and Borg scale for breathlessness ↑ and spirometry and cardiopulmonary exercise test ↓ for AT more than QG* <u>Patient Reported Outcomes:</u> Parkinson's Disease Questionnaire ns for both; Unified Parkinson's Disease Rating Scale ns; Brown's Disability Scale ns <u>Psychological:</u> Beck Depression Inventory ns
Chan Qin Lau Woo Au Choy Wingyee Lee & Lee. 2004 Hong Kong	132 History of post- menopausal and sedentary  54 years 0/132	12 months (45 min 5 x days)	Tai Chi Chuan Yang Style (n=54)	UC (n=54)	<u>Bone Density:</u>  Fractures (1 TC and 3 UC) BMD measured by Dual energy x-ray absorptiometry in femoral neck, ↓ in TC less than UC ns and trochanter ↓ both ns; peripheral quantitative computed tomography of distal and ultradistal tibia ↓ less in TC than UC *

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Channer Barrow Barrow Osborne & Ives 1996 UK	126 History of MI 58.5 years ??	8 weeks (2 days x 3 weeks, then 1 day x 5 weeks)	TC Wu Chian- Ch'uan (n=38)	Aerobic Exercise (n=41) or Cardiac Support Group (n=41) discussed risk factor modification and problems in rehab.	<u>Cardiopulmonary:</u>  Immediate SBP and DBP ↓ TC and AE ns and HR ↑ in AE more than TC *; Over time, SBP ↓ both ns and DBP and resting HR↓ in TC more than AE *; SG too small for comparison
Chen Yeh & Lee 2006 Taiwan	87 History of BMD T ≥ -2.5 45years 0/87	12 week (studied for 2 weeks, then 3 days/week)	QG Baduanjin (n=44)	No Qigong (43)	<u>Bone Density:</u>  BMD maintained in QG and ↓ in NQ*; <u>Immune/Inflammation</u> Interleukin-6↓ in QG and ↑ in NQ*
Cheung Lo Fong Chan Wong Wong Lam Lau Karlberg 2005 Hong Kong	88 Older adults in community, history of hypertension 54.5 years 37/51	16 wk (120 min x 2 days x 4 weeks then monthly and encouraged to practice 60 min in AM and 15 min in PM x 7 days)	QG Guolin (n=37)	Exercise (n=39)	<u>Cardiopulmonary:</u>  BP, HR, waist circumference, BMI, Total cholesterol, renin and 24 hour urinary protein excretion ↓ QG and E ns; ECG QG and E nc/ns  <u>QOL:</u> SF-36 ↓ E ns <u>Psychological:</u> Beck Anxiety Inventory ↓ and Beck Depression Inventory ↑ QG and E ns

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Choi Moon & Song 2005  South Korea	59 Living in care facility, ambulatory with history of at least 1 fall risk factor 77.8 years 15/44	12 weeks (35 min x 3 days)	Tai Chi Sun-style (n=29)	UC (30)	<u>Falls and Balance:</u>  Falls ns, but falls efficacy for <b>TC</b> ↑ and ↓ <b>UC*</b> ; knee and ankle strength, OLS eyes open, and Toe reach ↑ and 6 meter walk ↓ more than <b>UC*</b> : OLS eyes open nc <u>Self-efficacy:</u> Falls efficacy for <b>TC</b> ↑ and ↓ <b>UC*</b>
Chou Lee Yu Macfarlane Cheng Chan & Chi 2004  Hong Kong	14 Community dwelling Chinese, history of depression from a psycho-geriatric clinic 72.6 years  7-Jul	3 months (45 min x 3 days)	Tai Chi Yang Style 18 form (n=7)	Waitlist (n=7)	<u>Psychological:</u>  Center for Epidemiological Studies Depression Scale ↓ <b>TC</b> more than <b>W*</b>
Elder, Ritenbaugh Mist Aickin Schneider Zwickey & Elmer 2007  USA	92 History of completing 12 week wt loss intervention and loss of at least 3.5 kg  47.1 years 13/79	24 weeks (10 hours overall with 28 min qigong sessions)	Qigong Emie Zhen Gong (n=22)	Tapas Acupressure Technique (n=27) and Self-Directed Support (n=24)	<u>Cardiopulmonary:</u>  Wt loss maintenance for <b>TAT</b> and ↑ <b>QG</b> and <b>SDS*</b>

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Faber Bosscher Chin Paw & vanWieringen  2006 Netherlands	238 Frail (51%) or pre-frail (48.9%) older adults living in care facility 85 years  50/188	20 week (60 min exercise and 30 min social time x day x 4 weeks for socialization, then x 2 days for 16 weeks)	Tai Chi (balance exercises inspired by TC) (n=66)	Functional Walking (80) or UC	<u>Falls and Balance:</u>  Falls lower for TC more than FW and UC ns; When FW and TC combined, Fall risk↓ and physical function (6 meter walk, Timed chair stand, TUG, and FICSIT-4) ↑ compared to UC in pre-frail*, frail ns. also TC compared to FW ns <u>Patient Reported Outcomes:</u> Performance Oriented Mobility Assessment ↑ for TC and FW and exercise groups combined more than UC* and pre-frail*, frail ns; Groningen Activity Restriction Scale ↓ for FW more than control* TC vs UC ns
Fransen Nairn Winstanley Lam & Edmons  2007 Australia	152 Older adults, history of chronic symptomatic hip or knee osteoarthritis 70.8 years 40/112	12 week (60 min x 2 days)	TC for Arthritis by Dr. Lam from Sun Style 24-forms (n=56)	Hydrotherapy (n=55) and Wait List control (n=41)	<u>Physical Function:</u>  WOMAC: Pain and function ↓ TC and H ns with treatment effect for physical function moderate*; pain score ↓ for H compared to WL*, TC ns; Physical performance: TUG, 50-foot walk, and stair climb ↓ more for H than WL*; and timed stair climb for ↓ TC and H ns  <u>QOL:</u> SF-12 Physical ↑ H more than WL* and TC more than WL borderline*; SF-12 Mental ns <u>Patient Reported Outcomes:</u> Pain and function ↓ TC and H ns <u>Psychological:</u> Depression Anxiety & Stress 21 ↓ in H* and TC ns

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Galantino Shepard Krafft Laperriere Ducette Sorbello Barnish Condoluci & 2005 USA	38 History of long term care of HIV/AIDS Between 20 and 60  38/0	8 weeks (60 min x 2 days)	TC (n=13)	Aerobic Exercise (n=13) and UC (n=12)	<u>Physical Function:</u>  FR, SR, Sit Up, and Physical Performance Test all improved more than UC* and TC compared to AE nc <u>QOL:</u> Medical Outcomes Short Form-HIV improved TC and AE more than control*; Spiritual Well Being improved TC AE and UC ns <u>Psychological:</u> Profile of Mood States improved TC and AE more than control*
Gatts and Woollacott 2006 USA	19 Balance impaired seniors 68-92 years  17-Feb	3 weeks (90 min x 5 days)	Tai Chi Twelve Classical Tai Chi Postures (n=11)	TC Based and axial mobility program ; same group practiced TC after control time (n=8)	<u>Falls and Balance:</u>  TUG ↓ more for TC than control*; FR↑ for TC and control; OLS and tandem stance both legs ↑ more TC than control*; tibialis anterior more ↑ for TC than control*; gastrocnemius ↑ only TC after control time*
Gemmell & Leathem 2006 New Zealand	18 History of traumatic brain injury symptoms 45.7 years 9-Sep	6 weeks (45 min x 2 days)	TC Chen Style (n=9)	Waitlist UC (n=9)	<u>QOL:</u>  SF-36 and Rosenberg Self-Esteem Scale no different ns except role emotional ↑ TC more than UC* <u>Psychological:</u> Visual Analogue Mood Scales improved TC more than UC*; Rosenberg Self-Esteem Scale nc ns

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Greenspan Wolf Kelley O'Grady 2007  USA	269 Congregate independent living, transitionally frail with at least 1 fall in past year >70 years and 50% over 80 0/269	48 week (60 increasing to 90 min x 2 days)	TC 6 simplified forms (n=103)	Wellness Education (n=102)	<u>Physical Function:</u>  Sickness Impact Profile for physical function and ambulation ↓ more TC than WE* <u>Patient Reported Outcomes:</u> Sickness Impact Profile and physical and ambulation perceived health status ↓ TC more than WE* and Self Reported Health nc TC and WE ns
Hammond & Freeman  2006  UK	133 History of fibromyalgia from a rheumatology outpatient department 48.53 years 13/120	10 weeks (45 min x 1 day)	Tai Chi for Arthritis (part of patient Education group including fibromyalgia information, postural training, stretching and weights) (n=52)	Relaxation Group (n=49)	<u>Self-efficacy:</u>  Arthritis Self-Efficacy Scale ↑ TC more than RG at 4 months* at 8 months ns <u>Patient Reported Outcomes:</u> Fibromyalgia Impact Questionnaire ↓ TC more than RG* at 4 months* at 8 months ns <u>Psychological:</u> Anxiety and depression TC and TG ns
Hart Kanner Gilboa-Mayo Haroeh-Peer Rozenhul- Sorokin Eldar 2004  Israel	18 History of stroke, community-dwelling 54.77 years  16/2	12 weeks (60 min x 2 days)	TCC   (n=9)	Balance Exercises (n=9)	<u>Falls and Balance:</u>   BBS, OLS, Emory Fractional Ambulation Profile, Romberg, TUG improved in BE*, not TCC ns <u>QOL:</u> Duke Health Profile improved TC*, not BE ns

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Hartman Manos Winter Hartman Li & Smith 2000  USA	33 Community dwelling with lower extremity osteoarthritis 68 years  28-Apr	12 weeks (60 min x 2 days)	TC 9 form Yang (18)	Usual Care with phone calls every 2 weeks to discuss issues related to Osteoarthritis (n=15)	<u>Physical Function:</u>  OLS, 50-ft walk, and chair rise TC and UC ns with small to moderate effect size for TC only <u>QOL:</u> Arthritis Impact Measurement Scale II(satisfaction with life) ↑ and tension ↓ more for TC than UC* Pain and mood both ns <u>Self-efficacy:</u> Arthritis self-efficacy ↑ TC more than UC* <u>Falls and Balance:</u>
Hass Gregor Waddell Oliver Smith Fleming Wolf  2004  USA	28 Older adults transitioning to frailty 79.6 years  ??	48 weeks( 60 min x 2 days)	Tai Chi 8 of 24 simplified forms (n=14)	Wellness Education (n=14)	<u>Falls and Balance:</u>  Center of pressure during S1 and S2 improved for TC more than WE* S3 for both ns
Irwin Olmstead & Oxman  2007  USA	112 Healthy older adults 70 years 41/71	16 weeks (40 min x 3 days)	Tai Chi Chih (n=59)	Health Education (n=53)	<u>QOL:</u>  SF-36 improved for physical functioning, bodily pain, vitality and mental health for TC more than HE*; Role emotional ↓ for HE more than TC*; Role physical, general health, and social functioning both groups ns <u>Psychological:</u> Beck Depression Score ↑ TC and HE ns <u>Immune/Inflammation:</u> Varicella zoster virus-Responder cell frequency ↑ TC more than HE*
Irwin Pike Cole & Oxman 2003  USA	36 Healthy older adults 60 years  13-May	15 week (45 min x 3 days)	Tai chi Chih (n=14)	WaitList (n=17)	<u>QOL:</u>  SF-36 only role-physical and physical functioning improved more for TC than WL* <u>Immune/Inflammation:</u> Varicella zoster virus-cell-mediated immunity ↑ more for TC than WL*



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Jin 1992 Australia	96 Tai Chi practitioners 36.2 years 48/48	History of TC 46.4 mo males/ 34 months females 2 sessions of exposure to stress followed by	Tai Chi Long form or Yang Style (n=24)	Brisk Walking (n=24), TC Meditation (n=24), and Neutral Reading (n=24)	<u>Psychological:</u> Profile of Mood States improved all treatments* with state anxiety ↓ in TC more than reading*; BP and HR ↑ under stress for TC and BW more than M and NR*; Adrenaline ↓ more for TC than M*; noradrenaline ↑ more for TC than NR*; and salivary cortisol ↑ all groups*
Judge Lindser Underwood & Winsemius 1993  USA	21 Sedentary women  68 years  0/21	6 months( 20 min walking plus other exercise x 3 days for TC and no exercise for 12 weeks, then 30 min x1 day for FT)	Tai Chi simple with strength training and walking (n=12)	Flexibility Training (n=9)	<u>Falls and Balance:</u>  OLS ↑ more for TC than FT ns; knee extension ↑ more for TC than FT*; and sitting leg press improved TC and FT ns
Kutner, Barnhart, Wolf, McNeely, & Xu  1997  USA	130 TC Balance training and control mostly women / Healthv older adults 76.2 years ??	15 weeks (45 min total x 2 days TC and 1 day BT and ED)	TC 10 modified forms from 108	Balance Training and Education Control	<u>QOL:</u>  SF-36 all groups nc <u>Self-efficacy:</u> Self confidence ↑ more for BT than EC*; <u>Psychological:</u>
Lansinger Larsson Persson & Carlsson 2007  Sweden	122 History of long term nonspecific neck pain 43.8 years  36/86	3 month (1 hour x 1 2 days/week x 10- 12 sessions)	Qigong Biyun (n=60)	Exercise Therapy (n=62)	<u>Physical Function:</u>  Grip strength and Cervical ROM ↑ both groups ns <u>Patient Reported Outcomes:</u> Neck pain and Neck Disability Index ↓ both groups ns

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Lee Lee Kim & Choi 2004a AND Lee Lim & Lee 2004b Korea	36 History of hypertension 53.4 years 14/22	8 wk (30 min x 2 days)	Qigong Shuxinpingxuegong (n=17)	WaitList (n=19)	<p><u>Cardiopulmonary:</u> (2004a) BP ↓ more in <b>QG</b> than <b>WL*</b>; HDL and APO-A1 ↑ more in <b>QG</b> than <b>WL*</b>; high-density lipoprotein and Apolipoprotein A1 ↑ and total cholesterol ↓ in <b>QG</b> pre-post*; Triglycerides ↓ in <b>QG</b> and ↑ in <b>WL</b> ns</p> <p><u>Self-efficacy:</u> (2004b) Self efficacy and perceived benefits ↑ in <b>QG</b> and ↓ in <b>WL*</b></p> <p><u>Psychological:</u> (2004b) Emotional state ↑ in <b>QG</b> and ↓ in <b>WL*</b></p>
Lee Lee Kim & Moon 2003a AND Lee Lee Choi & Chung 2003b Korea	58 History of hypertension 56.2 years	10 weeks (30 min x 3 days)	Qigong Shuxinpingxuegong (n=29)	UC WaitList (n=29)	<p><u>Cardiopulmonary:</u> (2003a) HR ↓ more in <b>QG</b> than <b>WL*</b>; Epinephrine and norepinephrine ↓ for <b>QG</b> and ↑ for <b>WL*</b>; cortisol ↓ for <b>QG</b> and ↑ for <b>WL</b> ns</p> <p><u>Psychological:</u> (2003a) Self report stress ↓ <b>QG</b> more than <b>WL*</b>; Epinephrine and norepinephrine ↓ for <b>QG</b> and ↑ for <b>WL*</b>; cortisol ↓ for <b>QG</b> and ↑ for <b>WL</b> ns</p> <p><u>Cardiopulmonary:</u> (2003b) BP and catecholamines ↓ for <b>QG</b> and ↑ for <b>UC*</b>; Ventilatory function ↑ more for <b>QG</b> than <b>UC*</b></p>

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Lee Y. K. Lee & Woo 2007a Hong Kong	139 Resident of care facility, ambulatory, Chinese and 82.7 years 45/96	26 weeks (60 min x 3 days)	Tai Chi (n=66)	UC (n=73)	<u>QOL:</u> Health Related Quality of Life ↑ TC more than UC* Psychological Symptoms: Self Esteem ↑ TC more than UC*
Li Fisher Harmer & Shirai 2003 USA	48 Older adults 68.88 years	3 months ( 3 days/wk)	Tai Chi Yang 8-form easy Tai Chi (n=26)	Stretching Control (n=22)	<u>Falls and Balance</u>  OLS improved TC more than SC* <u>Physical Function:</u> SF-12 physical, instrumental activities of daily living, 50-ft walk, and chair rise all improved TC more than SC* <u>Psychological:</u> SF-12 mental ↑ more TC than SC*
Li Fisher Harmer Irbe Tearse & Weimer 2004 USA	118 History of moderate sleep complaints and community dwelling adults 75.4 years 22/96	24 week (60 min x 3 days)	Tai chi Yang (n=62)	Exercise Control (n=56)	<u>Physical Function:</u>  OLS and SF-12 physical ↑; and chair rise and 50-ft walk ↓ TC more than EC* <u>Patient Reported Outcomes:</u> Sleep duration and efficiency ↑ and sleep quality, latency, duration, and disturbances; Epworth Sleepiness Scale; and Pittsburg Sleep Quality Index ↓ more for TC than EC*; Sleep dysfunction both and medication ↓ TC only ns <u>Psychological:</u> SF-12 mental ↑ both ns

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Li Harmer Fisher McAuley Chaumeton Eckstrom & Wilson 2005b AND  Li Fisher Harmer & McAuley 2005a USA	256 Sedentary 77.48 years 77/179	6 month (60 min x 2 days)	TC Yang Style 24 forms (n=125)	Stretching Control (n=131)	<u>Falls and Balance:</u> (2005b)  Fewer falls and fewer injurious falls for <b>TC</b> than <b>SC*</b> ; and BBS, Dyamic Gait Index, FR and OLS ↑ and 50 ft walk and TUG ↓ more for <b>TC</b> than <b>SC*</b> all sustained at 6 month follow-up <u>Falls and Balance:</u> (2005a)  Activities Specific Balance ↑ more for <b>TC</b> than <b>SC*</b> <u>Self-efficacy:</u> (2005a) Falls Self-efficacy↑ (mediator) and fear of falling (SAFFE) ↓ more for <b>TC</b> than <b>SC*</b> <u>Psychological:</u> Fear of falling (SAFFE) ↓ more for <b>TC</b> than <b>SC*</b>
Li Harmer McAuley Duncan Duncan Chaumeton & Fisher 2001a USA	49 Sedentary and community dwelling  72.8 years  Sep-85	6 month (60 min x 2 days)	Tai Chi Yang style 24 forms (n=49)	WaitList (n=45)	<u>Physical Function:</u>  SF-20 (physical function) ↑ more <b>TC</b> than <b>WL*</b>



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Maciaszek Osinski Szeklicki & Stemplewske 2007 Poland	49 Sedentary, history of osteopenia or osteoporosis 60 to 82.1 years 49/0	18 week (45 min x 2 days)	Tai Chi 24 form (n=25)	UC (n=24)	<u>Falls and Balance:</u>  Posturographic Platform (time ↓; % task performance and total length of path ↑ for TC*; and % task performance and total length of path ↑ more for TC than UC*
Mannerkorpi & Arndorw 2004 Sweden	36 History of Fibromyalgia 45 years 0/36	3 month ( 20 min x 1 day)	Qigong with Body Awareness (n=19)	UC (n=17)	<u>Physical Function:</u> Chair stand and hand grip TC and UC ns <u>Patient Reported Outcomes:</u> Body Awareness ↑ TC more than UC*; fibromyalgia symptoms TC and UC ns
Manzaneque Vera Maldonado Carranque et al. 2004 Spain	29 Healthy young adults 18-21 14/15	1 month ( 30min x 5 days)	Qigong Eight Pieces of Brocade (low intensity) (n=16)	UC (n=13)	<u>Immune/Inflammation:</u>  Leukocytes, eosinophils, monocytes, and C3 levels ↓ TC than UC*; trend for neutrophils; and total lymphocytes, T lymphocytes, t helper lymphocytes, concentrations of complement C4 or immunoglobulins ns

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McGibbon Krebs Parker Scarborough Wavne & Wolf 2005 USA	36 History of vestibulopathy 59.5 years 16/20	10 weeks (70 min x 1 day)	Tai Chi Yang (n=19)	Vestibular Rehabilitation (n=12)	<u>Falls and Balance:</u>  Gait speed ↑ TC more than VR*; step length ↑ for TC and VR*; stance duration ↓ VR* more than TC; Step width ↑ VR and TC ns; Mechanical energy expenditure (hip ↓ TC more than VR*; ankle ↑ more for TC than VR*; knee and leg both ns); Peak trunk forward velocity ↑ TC more than VR*; forward velocity range and peak or range of lateral trunk velocity TC and VR ns; Peak trunk angular velocity ↑ more for VR than TC*; and trunk angular velocity in frontal plane and change in peak and range TC and VR ns; Trunk velocity peak and range positively correlated with change in leg mechanical energy expenditure for TC* and VR negative
McGibbon Krebs Wolf Wayne Scarborough & Parker 2004 USA	26 History of Vestibulopathy 56.2 years 15-Nov	10 weeks (70 min x 1 day)	Tai Chi Yang (n=13)	Vestibular Rehabilitation (n=13)	<u>Falls and Balance:</u>  Gaze stability ↑ more for VR than TC*; Whole-body stability and foot fall stability ↑ more for TC than VR*; Correlation between change in gaze stability and whole-body stability, and foot-fall stability and gaze stability for VR not TC*; Correlation between foot-fall stability and whole-body stability for VR and TC*
Motivala Sollers Thayer & Irwin 2006 USA	32 out of 63 who completed RCT for Herpes Zoster risk in aging study 68.5 years 14/18	37 week TC (? Min x 1 day)	TCC	Passive-Rest and slow moving physical movement	<u>Cardiopulmonary:</u>  Pre-ejection period ↑ post task more for TC than PR*; BP and HR TC and PR ns

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Mustian Katula Gill Roscoe Lang & Murphy 2004 AND Mustian Katula & Zhao 2006  USA	21 History of breast cancer 52 years  0/21	12 week (60 min x 3 days)	Tai Chi Yang and Chi Kung (n=11)	Psychosocial Support (n=10)	<u>Cardiopulmonary:</u> (2006)  6-minute walk ↑ for TC and ↓ for PS*; aerobic capacity ↑ for TC and ↓ for PS ns; <u>Physical Function:</u> (2006)  Muscle strength (hand grip ↑ for TC and ↓ for PS*); and flexibility (abduction ↑ TC and PS, flexion, extension, horizontal adduction and abduction ↑ more for TC than PS*; and body fat mass ↓ for TC and ↑ for PS ns <u>QOL:</u> (2004) Health Related Quality Of Life ↑ for TC* and ↓ PS ns <u>Psychological:</u> (2004) Self esteem ↑ for TC and ↓ for PS*
Nowalk Prendergast Bayles D'Amico & Colvin 2001 USA	110 Long term care residents  84 years  Jul-48	13 to 28 months ( 3 x week)	Tai Chi with behavioral component (n=38)	Physical therapy weight training (n=37) and Education Control (n=35)	<u>Falls and Balance:</u>  Falls No difference between groups
Pippa Manzoli Corti Congedo Romanazzi & Parruti 2007  Italy	43 History of stable chronic atrial fibrillation 68 years  30/13	16 week (90 minutes x 2 days)	Qigong (n=22)	Wait-List control (n=21)	<u>Cardiopulmonary:</u>  6-minute walk ↑ for QG and ↓ for WL*; Ejection fraction, BMI, cholesterol ns



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Sattin Easley Wolf Chen & Kutner  2005 USA	217 Transitionally frail with history of 1 or more falls in past year (55 African Americans) 70-97 years  12/205	48 weeks (60-90 min x 2 days)	Tai Chi 6 of 24 Simplified (n=158)	Wellness Education (n=153)	<u>Falls and Balance:</u>  Activities Specific Balance ↑ more among <b>TC</b> than <b>WE</b> * <u>Psychological:</u> Falls Efficacy Scale ↓ more among <b>TC</b> than <b>WE</b> *
Shen Williams Chyu Paige Stephens Chauncey Prabhu Ferris & Yeh  2007 USA	28 Sedentary from a senior living facility 79.1 years 7/21	24 week (40 min x 3 days)	<b>TC</b> Yang Style Simplified 24 forms (n=14)	Resistance Training (n=14)	<u>Bone Density:</u>  Sedentary older adults on bone metabolism (Serum Bone Specific alkaline phosphatase/Urinary Pyridinoline ↑ more for <b>TC</b> than <b>RT</b> at 6 weeks* and <b>TC</b> returned to baseline and <b>RT</b> less than baseline*; Parathyroid hormone ↑ more for <b>TC</b> than <b>RT</b> at 12 weeks*; serum 1,25-vitamin D3 <b>TC</b> and <b>RT</b> ns; serum calcium ↑ more for <b>TC</b> than <b>RT</b> at 12 weeks compar <b>ED</b> to 6 weeks*; urinary calcium ↓ for <b>TC</b> * not <b>RT</b> ; serum and urinary Pi <b>TC</b> and <b>RT</b> ns
Song Lee Lam & Bae 2003  AND Song Lee Lam & Bae 2007 Korea	72 History of osteoarthritis and no exercise for 1 year prior 63 years 0/72	12 week (60 min x 3 days for 2 weeks then x 1 day for 10 weeks)	Tai Chi Sun Style modified for arthritics (n=22)	<b>UC</b> (n=21)	<u>Cardiopulmonary:</u> (2003)  BMI, 13 minute ergometer <b>TC</b> and <b>UC</b> ns <u>Falls and Balance:</u> (2003)  OLS, trunk flexion and sit ups ↑ more for <b>TC</b> than <b>UC</b> *; Flexibility and knee strength <b>TC</b> and <b>UC</b> ns <u>Patient Reported Outcomes:</u> (2007) Pain and stiffness ↓ and perceived benefits ↑ more for <b>TC</b> than <b>UC</b> *; <b>TC</b> performed more health behaviors than <b>UC</b> *

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Source	No. of Subjects /	Exercise Duration	Exercise Group	Control group	Reported Outcomes *P<.05
Stenlund Lindstrom Granlund & Burell  2005  Sweden	95 History of coronary artery disease 77.5 years 66/29	12 weeks (60 min QG and 120 min of discussion on various themes)	Qigong (TC & Medicinsk Qigong) (n=48)	UC (n=47)	<u>Falls and Balance:</u>  Falls Efficacy Scale, tandem standing, OLS Left, Climb boxes Left TC and UC ns; OLS Right and climb boxes right ↑ more for TC than UC*; and co-ordination ↓ more for UC than TC*; and Self reported activity level ↑ for TC more than UC* <u>Psychological:</u> Fear of falling between TC and UC ns
Thomas Hong Tomlinson Lau Lam Sanderson & Woot  2005  Hong Kong	207 Healthy, community dwelling 68.8 years  113/94	12 months( 60 min x 3 days)	Tai Chi Yang style 24 forms (n=64)	Resistance Training (n=65) or UC (n=78)	<u>Cardiopulmonary:</u>  Energy expenditure ↑ for TC and RT more than UC ns; Waist circumference and HR ↓ more TC and RT than UC ns; Insulin sensitivity ↓ more for RT than UC* and more for TC than UC ns; BMI. bodv fat. BP. Cholesterol. and glucose TC. RT. and UC ns
Tsai Wang Chan Lin Wang Tomlinson Hsieh Yang & Liu  2003  Taiwan	76 Sedentary with pre-hypertension or Stage I  52 years  38/38	12 wk ( 50 min x 3 days)	Tai Chi Yang (n=37)	UC (n=39)	<u>Cardiopulmonary:</u>  BP& total cholesterol ↓ for TC* and ↑ for UC ns; BMI and HR TC and UC ns; Triglyceride ↓ TC* and ↑ UC*; LDL ↓ TC* and ↑ UC ns; High-density lipoprotein ↑ TC* and ↓ UC ns <u>Psychological:</u> Trait and State anxiety ↓ TC*more than UC ns

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Source	No. of Subjects /	Exercise Duration	Exercise Group	Control group	Reported Outcomes *P<.05
Tsang H.W. Fung Chan & Chan 2006 Hong Kong	82 history of depression and chronic illness 82.4 years 16/66	16 weeks (30-45 min x 3 days)	Qigong Baduanjin (n=48)	Newspaper Reading group with same intensity (n=34)	<u>QOL:</u> Personal Well Being ↑ for <b>QG</b> and ↓ <b>NR*</b> ; and General Health Questionnaire ↓ <b>QG</b> and ↑ <b>NR*</b> ; and Self-concept ↓ more <b>TC</b> than <b>NR*</b> <u>Self-efficacy:</u> Chinese General Self-efficacy and Perceived Benefits Questionnaire ↑ more for <b>QG</b> than <b>NR*</b> <u>Psychological:</u> Geriatric Depression Scale ↓ more for <b>QG</b> than <b>NR*</b>
Tsang HW Mok Yeung & Chan 2003 Hong Kong	50 History of chronic disease 74.6 years 26/24	12 week (60 min x 2 days)	Qigong Eight- Section Brocades (n=24)	Basic Rehabilitation activities	<u>QOL:</u> Physical health, activities of daily living psychological health and social relationships improved for <b>QG*</b> ; Self-concept and WHOQOL- BREF <b>QG</b> and <b>BR</b> ns <u>Psychological:</u> Geriatric Depression Scale ↓ <b>TC</b> and <b>BR</b> ns
Tsang T. Orr Lam Comino & Singh 2007 Australia	38 Sedentary, community dwelling, type 2 diabetics 65.4 years 8/30	16 week (45 min x 2 days)	Tai Chi for diabetes (12 movement hybrid from Yang and Sun (n=17)	Sham Exercise (seated calisthenics and stretching) (n=20)	<u>Physical Function:</u> 6-minute walk, habitual and maximal gait speed, muscle strength and peak power ↑ <b>TC</b> more than <b>SE</b> ns; Endurance ↓ more for <b>SE</b> than <b>TC</b> ns; and Habitual Physical Activity ↑ <b>TC</b> and ↓ <b>SE*</b> <u>Falls and Balance:</u> Balance index ↓ <b>TC</b> and <b>SE</b> ns; OLS open ↑ <b>TC</b> and nc <b>SE</b> ns; OLS closed and tandem walk ↓ <b>TC</b> and <b>SE</b> ns; Falls 0-2 <b>TC</b> and <b>SE</b> ns <u>QOL:</u> SF-36 (except Social Function ↑ for <b>TC</b> and ↓ <b>SE*</b> ) and Diabetes Integration Scale <b>TC</b> and <b>SE</b> ns

**Table 1. Randomized Controlled Trials Testing Health Benefits of Qigong and Tai Chi**

Source	No. of Subjects /	Exercise Duration	Exercise Group	Control group	Reported Outcomes *P<.05
Voukelatos Cumming Lord & Rissel 2007 Australia	702 Community dwelling 69 years 112/589	16 weeks (60 min x 1 day)	Tai Chi 38 Programs mostly Sun-style (83%) Yang (3%) (n=271)	Wait-List (n=256)	<u>Falls and Balance:</u>  Sway on floor and foam mat, lateral stability, coordinated stability, and choice stepping reaction time improved <b>TC</b> more than <b>WL</b> *; Maximal leaning balance range ↑ <b>TC</b> more than <b>WL</b> ns; Fall rates less for <b>TC</b> (n=347) than <b>WL</b> (n=337)*
Wang Roubenoff Lau Kalish Schmid Tighiouart Rones & Hibberd 2005 USA	20 Community dwelling with Rheumatoid Arthritic class I or II 49.5 years 15-May	12 week (60 min x 2 days)	Tai Chi Yang Style (n=10)	Stretching and Wellness Education (n=10)	<u>Physical Function:</u>  Chair stand and 50-ft walk ↑ <b>TC</b> and <b>WE</b> ns; American College of Rheumatology 20 ↓ <b>TC</b> more than <b>WE</b> *; hand grip not reported; Health Assessment Questionnaire ↑ more <b>TC</b> than <b>WE</b> *; Erythrocyte sedimentation rate and C-Reactive protein ns <u>QOL:</u> SF-36 ↑ more <b>TC</b> than <b>WE</b> with only vitality* <u>Patient Reported Outcomes:</u> Pain ↓ <b>TC</b> and ↑ <b>WE</b> ns <u>Psychological:</u> Center for Epidemiological Studies Depression Scale ↑ more <b>TC</b> than <b>WE</b> * <u>Immune/Inflammation:</u> ESR and C-Reactive protein ns (note <b>TC</b> higher level at baseline)

**Table 1. Randomized Controlled Trials Testing Health Benefits of Qigong and Tai Chi**

Source	No. of Subjects /	Exercise Duration	Exercise Group	Control group	Reported Outcomes *P<.05
Wennenberg Gunnarsson & Ahlstrom 2004 Sweden	36 History of Muscular Dystrophy 33-80 years 19/17	12wk (Weekend immersion, then 45-50 min x 1 day for 4 weeks, then every other week for 8 weeks)	Qigong (n=16)	Wait-List control (n=15)	<p><u>Cardiopulmonary:</u></p> <p>Forced vital capacity and expiratory volume ↓ QG and WL ns</p> <p><u>Falls and Balance:</u></p> <p>BBS unchanged for QG and ↓ WL ns for intervention period; subgroup A</p> <p><u>QOL:</u></p> <p>SF-36 general health unchanged for QG and ↓ WL* and other dimensions ns; Ways of Coping: positive reappraisal coping ↓ for QG and unchanged for WL*, Confrontative coping ↑ QG and ↓ WL ns, and other dimensions ns</p> <p><u>Psychological:</u></p> <p>Montgomery Asberg Depression Rating Scale QG and WL ns</p>
Winsmann 2006 USA	47 Veterans 49.55 years 47/0	4 weeks (75 min x 2 days)	Tai Chi Chuan Yang Style (n=23)	UC included group therapy (n=24)	<p><u>Patient Reported Outcomes:</u></p> <p>Dissociative Experiences and Symptom Checklist 90 ↓ TC more than UC ns</p>
Wolf O'Grady Easley Guo Kressig & Kutner 2006 USA	311 Transitionally frail with average of 5.6 comorbidities 80.9 years 20/291	48 weeks (60-90 min x 2 days)	Tai chi 6 of 24 simplified forms (n=158)	Wellness Education (n=153)	<p><u>Cardiopulmonary:</u></p> <p>BMI ↓ TC and ↑ WE*; SBP and HR ↓ TC and ↑ WE*; DBP ↓ TC more than WE*</p> <p><u>Physical Function:</u></p> <p>Gait Speed and FR ↑ TC and WE ns; Chair stands ↓ 12.3% TC and ↑ 13.7% WE*; 360° turn and pick up object similar change TC and WE ns; and OLS nc</p>

**Table 1. Randomized Controlled Trials Testing Health Benefits of Qigong and Tai Chi**

Source	No. of Subjects /	Exercise Duration	Exercise Group	Control group	Reported Outcomes *P<.05
Wolf Sattin Kutner O'Grady Greenspan & Gregor 2003b  USA	311 Transitionally frail with average of 5.6 comorbidities  80.9 years  20/291	48 weeks (60-90 min x 2 days)	Tai chi 6 of 24 simplified forms (145)	Wellness Education (141)	<u>Falls and Balance:</u>  TC lower risk for falls from month 4 to 12; RR falls TC and WE 0.75 (CI=0.52-1.08) ns
Wolf Barnhart Ellison Coogler & Gorak 1997a  USA	72 Sedentary 77.7 years  Dec-60	15 weeks (60 min x 2days TC group)	Tai Chi 108 forms simplified to 10 forms (n=19)	Balance Training (n=16) and Education Control (n=19)	<u>Falls and Balance:</u>  Balance: Dispersion for OLS (eyes open), toes up (eyes open and closed), Center of Balance X with toes up (eyes open) and Center of Balance Y (OLS eyes open and closED) ↓ more BT than ED and TC*; Dispersion for toes up (eyes open), Center of Balance X OLS (eyes open and closed) and Toes up (eyes closed), and Center of Balance Y for toes up (eyes open and closed) TC BT and ED ns: <u>Psychological:</u> Fear of falling ↓ more for TC than BT and ED*
Wolf Barnhart Kutner McNeelly Coogler & Xu 2003a  USA	200 Community dwelling  76.2 years  58/242	15 weeks (45 minutes weekly in class plus 15 min 2 x daily)	Tai Chi (n=72)	Balance Training (n=64) and Education Control (n=64)	<u>Cardiopulmonary:</u>  BP↓ more for TC than BT and ED*; 12-minute walk ↑ 0.01 mile for BT and ED and ↓ 0.02 for TC*; Body composition changes for TC, BT and ED ns <u>Physical Function:</u> Left hand grip strength ↓ more in BT and ED than TC*; Strength of hip, knee and ankle via Nicholas MMT 0116 muscle tester, lower extremity ROM changes TC, BT and ED ns <u>Falls and Balance:</u>

**Table 1. Randomized Controlled Trials Testing Health Benefits of Qigong and Tai Chi**

Source	No. of Subjects /	Exercise Duration	Exercise Group	Control group	Reported Outcomes *P<.05
					Intrusiveness↓ more for <b>TC</b> than <b>ED</b> ns; RR for falls in <b>TC</b> 0.632 (CI 0.45-0.89)* using FICSIT fall definition and for <b>BT</b> and other fall definitions ns <u>Psychological:</u> Fear of falling ↓ more for <b>TC</b> than <b>BT</b> and <b>ED</b> *
Woo Hong Lau & Lynn 2007 China	180 Community dwelling 68.91 years  90/90	12 months (?min x 3 days)	Tai Chi Yang style 24 forms (n=30)	Resistance Training (n=29) and UC (n=29)	<u>Falls and Balance:</u>  Muscle strength (grip strength and quadriceps) ns; Balance (SMART Balance Master, stance time, gait velocity, and bend reach); and falls for <b>TC</b> , <b>RT</b> and <b>UC</b> ns <u>Bone Density:</u> Women: BMD loss at hip less for <b>TC</b> and <b>RT</b> than <b>UC</b> *; BMD loss at spine less for <b>TC</b> and <b>RT</b> than <b>UC</b> ns; Men: no difference in % change in BMD
Yang Verkuilen Rosengren Grubisich Reed & Hsiao-Weckler 2007a USA	49 Healthy adults  80.4 years 10/39	6 months (60 min x 3 days)	Qigong (sitting and standing) and Taiji Chen style Essential 48 form (n=33)	Wait-List (n=16)	<u>Falls and Balance:</u>  Sensory Organization Test vestibular ratios and Base of Support measures ↑ more for <b>TC</b> than <b>WL</b> *↑; Sensory Organization Test visual ratios and feet opening angle for <b>TC</b> and <b>WL</b> nc
Yang Verkuilen Rosengren Mariani Reed Grubisich & Woods 2007b USA	50 History of received flu immunization and sedentary 77.2 years 13/37	20 weeks (60 min x 3 days)	Qigong (sitting and standing) and Taiji Chen style Essential 48 form (n=27)	Wait-List (n=23)	<u>Immune/Inflammation:</u>  Hemagglutination Inhibition assay ↑ 109% for <b>QG</b> compared to ~10% for <b>WL</b> *

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Source	No. of Subjects /	Exercise Duration	Exercise Group	Control group	Reported Outcomes *P<.05
Yeh Wood Lorell Stevenson Eisenberg Wayne et al. 2004  USA	30 History chronic stable heart failure 64 years 19/11	12 weeks ( 60 min x 2 days)	Tai chi Yang-style 5 core movements (n=15)	UC including pharmacologic therapy, dietary and exercise counseling (n=15)	<u>Cardiopulmonary:</u>  Peak O2 uptake ↑ TC and ↓ UC ns; 6-minute walk ↑ TC and ↓ UC*; Serum B-type natriuretic peptide ↓ TC and ↑ UC*; Plasma norepinephrine ↑ TC more than UC ns; and no differences in incidence of arrhythmia between groups  <u>QOL:</u> Minnesota Living with Heart Failure ↓ TC and ↑ UC*
Young Appel Jee & Miller 1999  USA	62 History of BP between 130 and 159 and not taking medications for hypertension or insulin (45.2% black) 66.7	12 weeks (60 min x 2 days class with goal of 30-45 min/4.5 days /week)	TC Yang Style 13 movements (n=31)	Aerobic Exercise class at 40 to 60% HR reserve (n=31)	<u>Cardiopulmonary:</u>  BP ↓ TC and AE*; BMI ↑ slightly TC and AE ns; and time in moderate activity, weekly energy expenditure, and leisurely walking ↑ for AE more than TC ns
Zhang Ishikawa-Takata Yamazaki Morita & Ohta  2006  China	47 History of poor balance 70.4 years 25/22	8 weeks ( 60 min x 7 days)	TC simplified 24 forms Zhou (n=24)	UC (n=23)	<u>Falls and Balance:</u>  OLS, trunk and flexion more TC than UC*; 10 minute walk ↓ TC and UC ns <u>Psychological Symptoms:</u> Falls Efficacy Scale ↑ more TC than UC*

† BBS, Berg Balance Scale; BMD, Bone Marrow Density; FR, Functional Reach; nc, no change in scores; ns, scores not significantly different between groups; OLS, One  
\*p < .05 between groups

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