

Table 1. Randomized Controlled Trials Testing Health Benefits of Tai Chi and Qigong
 Roger Jahnke OMD, Institute of Integral Qigong and Tai Chi & Linda Larkey PhD, Arizona State University

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 _{2 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 7/34	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
Burini Farabollini Ianucci, Rimatori Riccardi Capecci Provinciali & Ceravolo, 2006 Italy	26 History of Parkinson's disease 65 years 9/17	7 weeks each of Aerobics (45 min x w 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 (? Min x 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 ? Min x 3 days)	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
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 TC ↑ and ↓ UC*; knee and ankle strength, OLS eyes open, and Toe reach ↑ and 6 meter walk ↓ more than UC*; OLS eyes open nc <u>Self-efficacy:</u> Falls efficacy for TC ↑ and ↓ UC*

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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 7/7	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 ↓ TC more than W*
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 TAT and ↑ QG and SDS*
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 Condocluci & Farrar 2005 USA	38 History of long term care of HIV/AIDS Between 20 and 60 38/0	8 weeks (60 minx 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 2/17	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)	Falls and Balance: 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 & Leatham 2006 New Zealand	18 History of traumatic brain injury symptoms 45.7 years 9/9	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
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

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Hart Kanner Gilboa-Mayo Haroeh-Peer Rozentul-Sorokin Eldar 2004 Isreal	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
Hartman Manos Winter Hartman Li & Smith 2000 USA	33 Community dwelling with lower extremity osteoarthritis 68 years 4/28	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*
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 5/13	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 respective treatment	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 / Healthy 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> Rosenberg self esteem ↑ more TC than BT or EC ns
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
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 Shuxinpingxue gong (n=17)	WaitList (n=19)	<u>Cardiopulmonary:</u> (2004a) BP ↓ more in QG than WL*; HDL and APO-A1 ↑ more in QG than WL*; high-density lipoprotein and Apolipoprotein A1 ↑ and total cholesterol ↓ in QG pre-post*; Triglycerides ↓ in QG and ↑ in WL ns <u>Self-efficacy:</u> (2004b) Self efficacy and perceived benefits ↑ in QG and ↓ in WL* <u>Psychological:</u> (2004b) Emotional state ↑ in QG and ↓ in WL*

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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 Shuxinpingxue gong (n=29)	UC WaitList (n=29)	<u>Cardiopulmonary:</u> (2003a) HR ↓ more in QG than WL*; Epinephrine and norepinephrine ↓ for QG and ↑ for WL*; cortisol ↓ for QG and ↑ for WL ns <u>Psychological:</u> (2003a) Self report stress ↓ QG more than WL*; Epinephrine and norepinephrine ↓ for QG and ↑ for WL*; cortisol ↓ for QG and ↑ for WL ns <u>Cardiopulmonary:</u> (2003b) BP and catecholamines ↓ for QG and ↑ for UC*; Ventilatory function ↑ more for QG than UC*
	36 History of hypertension 53.4 years 14/22	8 wk (30 min x 2 days)	Qigong Shuxinpingxue gong (n=17)	WaitList (n=19)	
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)	QOL: 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 (? min x 3 days)	Tai Chi Yang 8-form easy Tai Chi (n=26)	Stretching Control (n=22)	Physical Function: SF-12 physical, instrumental activities of daily living, OLS, 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)	Physical Function: 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 TC than SC*; and BBS, Dyamic Gait Index, FR and OLS ↑ and 50 ft walk and TUG ↓ more for TC than SC* all sustained at 6 month follow-up <u>Falls and Balance:</u> (2005a) Activities Specific Balance ↑ more for TC than SC* <u>Self-efficacy:</u> (2005a) Falls Self-efficacy↑ (mediator) and fear of falling (SAFFE) ↓ more for TC than SC* <u>Psychological:</u> Fear of falling (SAFFE) ↓ more for TC than SC*
Li Harmer McAuley Duncan Duncan Chaumeton & Fisher 2001a USA	49 Sedentary and community dwelling 72.8 years 9/85	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 TC than SC*
Li Harmer McAuley Fisher Duncan & Duncan 2001b AND Li Fisher Harmer & McAuley 2002 AND Li Harmer Chaumeton Duncan Duncan 2002 AND Li McAuley Harmer Duncan & Chaumeton 2001 USA	94 Sedentary 72.8 years 9/85	6 month (60 min x 2 days)	Tai Chi Yang style 24 forms (n=49)	WaitList (n=45)	<u>Physical Function:</u> (2001b) SF-20 physical Function ↑ among TC more than WL over time* r scores <u>Self-efficacy:</u> (2001b) Self-efficacy ↑ among TC more than WL over time* r scores <u>QOL:</u> (2002) SF -20 (General Health Survey) ↑ more for TC than WL*; TC with lower levels of health perception, physical function, and high depression at baseline and Movement confidence ↑ = ↑physical function * <u>Psychological:</u> (2002) Physical function self-esteem and Rosenberg self-esteem ↑ more for TC than WL* <u>Self-efficacy:</u> (2001) Barrier and performance Self-efficacy ↑ TC more than WL*; exercise adherence ↑ TC than WL*; and SE conditions related to adherence for TC

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Maciaszek Osinski Szecklicki & 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
McGibbon Krebs Parker Scarborough Wayne & 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 relationship

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McGibbon Krebs Wolf Wayne Scarborough & Parker 2004 USA	26 History of Vestibulopathy 56.2 years 11/15	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
Mustian Katula Gill Roscoe Lang & Murphy 2004 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>QOL:</u> Health Related Quality Of Life ↑ for TC* and ↓ PS ns <u>Psychological:</u> Self esteem ↑ for TC and ↓ for PS*
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> 6-minute walk ↑ for TC and ↓ for PS*; aerobic capacity ↑ for TC and ↓ for PS ns; <u>Physical Function:</u> 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
Nowalk Prendergast Bayles D'Amico & Colvin 2001 USA	110 Long term care residents 84 years 7/48	13 to 28 months (? Minutes x 3)	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

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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 TC and ↓ for WL*; Ejection fraction, BMI, cholesterol ns
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 TC than WE* <u>Psychological:</u> Falls Efficacy Scale ↓ more among TC than WE*
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)	TC 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 TC than RT at 6 weeks* and TC returned to baseline and RT less than baseline*; Parathyroid hormone ↑ more for TC than RT at 12 weeks*; serum 1,25-vitamin D3 TC and RT ns; serum calcium ↑ more for TC than RT at 12 weeks compared to 6 weeks*; urinary calcium ↓ for TC* not RT; serum and urinary Pi TC and RT 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)	UC (n=21)	<u>Cardiopulmonary:</u> (2003) BMI, 13 minute ergometer TC and UC ns <u>Falls and Balance:</u> (2003) OLS, trunk flexion and sit ups ↑ more for TC than UC*; Flexibility and knee strength TC and UC ns <u>Patient Reported Outcomes:</u> (2007) Pain and stiffness ↓ and perceived benefits ↑ more for TC than UC*; TC performed more health behaviors than UC*

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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, body 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
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 QG and ↓ NR*; and General Health Questionnaire ↓ QG and ↑ NR*; and Self-concept ↓ more TC than NR* <u>Self-efficacy:</u> Chinese General Self-efficacy and Perceived Benefits Questionnaire ↑ more for QG than NR* <u>Psychological:</u> Geriatric Depression Scale ↓ more for QG than NR*
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 QG*; Self-concept and WHOQOL-BREF QG and BR ns <u>Psychological:</u> Geriatric Depression Scale ↓ TC and BR ns

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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 ↑ TC more than SE ns; Endurance ↓ more for SE than TC ns; and Habitual Physical Activity ↑ TC and ↓ SE* <u>Falls and Balance:</u> Balance index ↓ TC and SE ns; OLS open ↑ TC and nc SE ns; OLS closed and tandem walk ↓ TC and SE ns; Falls 0-2 TC and SE ns <u>QOL:</u> SF-36 (except Social Function ↑ for TC and ↓ SE*) and Diabetes Integration Scale TC and SE ns
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 TC more than WL*; Maximal leaning balance range ↑ TC more than WL ns; Fall rates less for TC (n=347) than WL (n=337)*
Wang Roubenoff Lau Kalish Schmid Tighiouart Ronas & Hibberd 2005 USA	20 Community dwelling with Rheumatoid Arthritic class I or II 49.5 years 5/15	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 ↑ TC and WE ns; American College of Rheumatology 20 ↓ TC more than WE*; hand grip not reported; Health Assessment Questionnaire ↑ more TC than WL*; Erythrocyte sedimentation rate and C-Reactive protein ns <u>QOL:</u> SF-36 ↑ more TC than WL with only vitality* <u>Patient Reported Outcomes:</u> Pain ↓ TC and ↑ WE ns <u>Psychological:</u> Center for Epidemiological Studies Depression Scale ↑ more TC than WL* <u>Immune/Inflammation:</u> ESR and C-Reactive protein ns (note TC higher level at baseline)
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)	<u>Cardiopulmonary:</u> Forced vital capacity and expiratory volume ↓ QG and WL ns <u>Falls and Balance:</u> BBS unchanged for QG and ↓ WL ns for intervention period; subgroup A <u>QOL:</u> 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 <u>Psychological:</u> Montgomery Asberg Depression Rating Scale QG and WL ns

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Source	No. of Subjects / Mean Age Sex (Male/Female)	Exercise Duration (minutes x days per week)	Exercise Group	Control group	Reported Outcomes *P<.05
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)	<u>Patient Reported Outcomes:</u> Dissociative Experiences and Symptom Checklist 90 ↓ TC more than UC ns
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)	<u>Cardiopulmonary:</u> BMI ↓ TC and ↑ WE* ; SBP and HR ↓ TC and ↑ WE* ; DBP ↓ TC more than WE* <u>Physical Function:</u> 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
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 12/60	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*

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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> Intrusiveness ↓ more for TC than ED ns; RR for falls in TC 0.632 (CI 0.45-0.89)* using FICSIT fall definition and for BT and other fall definitions ns <u>Psychological:</u> Fear of falling ↓ more for TC than BT and ED*
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 TC, RT and UC ns <u>Bone Density:</u> Women: BMD loss at hip less for TC and RT than UC*; BMD loss at spine less for TC and RT than UC ns; Men: no difference in % change in BMD
Yang Verkuilen Rosengren Grubisich Reed & Hsiao-Weckler 2007 USA	49 Healthy adults 80.4 years 10/39	6 months (60 min x 3 days)	Qigong (sitting and standing) and Taiji Chen style Esential 48 movement form (n=33)	Wait-List (n=16)	<u>Falls and Balance:</u> Sensory Organization Test vestibular ratios and Base of Support measures ↑ more for TC than WL*↑; Sensory Organization Test visual ratios and feet opening angle for TC and WL nc

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Source	No. of Subjects / Mean Age Sex (Male/Female)	Exercise Duration (minutes x days per week)	Exercise Group	Control group	Reported Outcomes *P<.05
Yang Verkuilen Rosengren Mariani Reed Grubisich & Woods 2007 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 movement form (n=27)	Wait-List (n=23)	<u>Immune/Inflammation:</u> Hemagglutination Inhibition assay ↑ 109% for TQ compared to ~10% for WL*
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 years 13/49	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 leg stance; SR, Sit and Reach; TUG, Timed Up & Go; ↑, increase in score; ↓, decrease in score.
 *P< .05 between groups