Supplementary Data

Appendix 1: Full List of References:

1) Powell LE. Myers AM. The Activities-specific Balance Confidence (ABC) Scale. J Gerontol 1995:50;28-34.

2) Myers AM, Fletcher PC, Myers AH, et al. Discriminative and evaluative properties of the Activities-Specific Balance Confidence (ABC) Scale. *J Gerontol*. 1998;53:M287–M294.

3) Tinetti ME. Richman D. Powell L. Falls efficacy as a measure of fear of falling. J Gerontol 1990;45:239-243.

4) Yardley L, Smith H. A prospective study of the relationship between feared consequences of falling and avoidance of activity in community-living older people. Gerontologist 2002;42:17–23.

5) Ko YM, Park WB, Lim JY, Kim KW, Paik NJ. Discrepancies between balance confidence and physical performance among community-dwelling Korean elders: a population-based study. Int Psychogeriatr 2009;21:738-47.

6) Cumming RG, Salkeld G, Thomas M et al. Prospective study of the impact of fear of falling on activities of daily living, SF-36 scores, and nursing home admission. J Gerontol A Biol Sci Med Sci 2000;55:299–305.

7) Bandura A. Self-efficacy: Toward a Unifying Theory of Behavioral Change. Psychological Review 1977; 84: 191-215.

8) Hill KD, Schwarz JA, Kalogeropoulos AJ, Gibson SJ. Fear of falling revisited**.** Arch Phys Med Rehabil 1996;77: 1025-1029.

9) Bruce DG, Devine A, Prince RL. Recreational physical activity levels in healthy older women: the importance of fear of falling. J Am Geriatr Soc 2002; 50: 84–89.

10) Schilling, BK, Falvo, MJ, Karlage, RE, et al. Effects of unstable surface training on measures of balance in older adults. J Strength Cond Res 2009;23: 1211–1216.

11) Arai T, Obuchi S, Inaba Y et al. The effects of short-term exercise intervention on falls self efficacy and the relationship between changes in physical function and falls self-efficacy in Japanese older people: a randomized controlled trial. Am J Phys Med Rehabil 2007; 86: 133–41.

12) Zhang JG, Ishikawa-Takata K, Yamazaki H et al. The effects of tai chi chuan on physiological function and fear of falling in the less robust elderly: An intervention study for preventing falls. Arch Gerontol Geriatr 2006;42:107– 116.

13) Cameron ID, Stafford B, Cumming RG et al. Hip protectors improve falls self efficacy. Age Ageing 2000;29:57–62.

14) Zijlstra R, van Haastregt, JCM, van Rossum E et al. Interventions to Reduce Fear of Falling in Community-Living Older People: A Systematic Review. Am Geriatr Soc 55:603–615, 2007.

15) Messecar DC. Review: several interventions reduce fear of falling in older people living in the community. Evid Based Nurs. 2008 Jan;11(1):21.

16) Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). *P*referred *R*eporting *I*tems for *S*ystematic Reviews and*M*eta-*A*nalyses: The PRISMA Statement. PLoS Med 6(6): e1000097. doi:10.1371/journal.pmed1000097

17) Legters K. Fear of falling. *Phys. Ther.* 2002;82:264 –272.

18) Sherrington C, Herbert RD, Maher CG, et al. PEDro. A database of randomized trials and systematic reviews in physiotherapy. Man Ther. 2000;5:223-6.

19) Foley NC, Teasell RW, Bhogal SK, Speechley MR. Stroke Rehabilitation Evidence-Based Review: methodology. Top Stroke Rehabil. 2003 Spring;10(1):1-7.

20) Hozo SP, Djulbegovic B, Hozo I. Estimating the mean and variation from the median, range, and the size of a sample. *BMC Med Res Methodol*. 2005;5:13

21) Cohen J. Statistical Power Analysis fir the behavioral Sciences. Second edition. Hillsdale, New Jersey, Lawrence Erlbaum Associates, 1998.

22) Sutton AJ, Higgins JPT. Recent developments in meta-analysis. *Statist Med*. 2008;27:625-650.

23) Hinman MR. Comparison of two short-term balance training programs for community-dwelling older adults. *Journal of Geriatric Physical Therapy* 2002; 25;10–15.

24) Lee JS, Hurley MJ, Carew D, Fisher R, Kiss A, Drummond N. A randomized clinical trial to assess the impact on an emergency response system on anxiety and health care use among older emergency patients after a fall. *Academic Emergency Medicine* 2007;14: 301–308.

25) Foss AJ, Harwood RH, Osborn F, Gregson RM, Zaman A, Masud T. Falls and health status in elderly women following second eye cataract surgery: a randomised controlled trial. *Age and Ageing 2006;* 35:66–71.

26) Hamel MF, Lajoie Y. Mental imagery. Effects on static balance and attentional demands of the elderly. *Aging Clinical and Experimental Research*, 2005;17: 223–228.

27) Campbell AJ, Robertson MC, Gardner MM et al. Randomised controlled trial of a general practice programme of home based exercise to prevent falls in elderly women. BMJ 1997;315:1065–1069.

28) Williams K, Mustian K, Kovacs C. A home-based intervention to improve balance, gait and self-confidence in older women. Activities, Adaptation & Aging 2002; 27:1-16.

29) Brouwer BJ, Walker C, Rydahl SJ. Reducing fear of falling in seniors through education and activity programs: A randomized trial. J Am Geriatr Soc 2003; 51:829–834.

30) Liu-Ambrose T, Khan KM, Eng JJ, et al. Balance confidence improves with resistance or agility training. Increase is not correlated with objective changes in fall risk and physical abilities. Gerontology. 2004;50:373-82.

31) Schoenfelder DP, Rubenstein LM. An exercise program to improve fall-related outcomes in elderly nursing home residents. Appl Nurs Res. 2004;17:21-31.

32) Devereux K, Robertson D, Briffa NK. Effects of a water-based program on women 65 years and over: a randomized controlled trial. Aust J Physiother. 2005;51:102-8.

33) Southard V. A Randomized Control Trial of the Application of Efficacy Training to Balance Assessment. Physical & Occupational Therapy in Geriatrics 2006; 25: 51-66.

34) Weerdesteyn V, Rijken H, Geurts AC, et al. A five-week exercise program can reduce falls and improve obstacle avoidance in the elderly. Gerontology. 2006;52:131-41.

35) McCormackG, Lewin G McCormack B et al. Pilot study comparing the influence of different types of exercise intervention on the fear of falling in older adults. Australas J Ageing 2004; 23 :131 - 135

36) Li F, McAuley E, Fisher KJ, Harmer P, Chaumeton N, Wilson NL. Self-efficacy as a mediator between fear of falling and functional ability in the elderly. J Aging Health 2002;14:452-466.

37) Sattin RW, Easley KA, Wolf SL, et al. Reduction in fear of falling through intense tai chi exercise training in older, transitionally frail adults. J Am Geriatr Soc 2005; 53: 1168–1178.

38) Logghe IH, Zeeuwe PE, Verhagen AP, et al. Lack of effect of Tai Chi Chuan in preventing falls in elderly people living at home: a randomized clinical trial. J Am Geriatr Soc. 2009;57:70-75.

39) Elley CR, Robertson MC, Garrett S et al. Effectiveness of a Falls-and-Fracture Nurse Coordinator to Reduce Falls: A Randomized, Controlled Trial of At-Risk Older Adults. J Am Geriatr Soc 2008;56:1383–1389.

40) Tinetti ME, Mendes de Leon CF, Doucette JT *et al*. Fear of falling and fall-related efficacy in relationship to functioning among community-living elders. J Gerontol 1994; 49: M140–M147.

41) van Haastregt JC, Diederiks JP, van Rossum E et al. Effects of a programme of multifactorial home visits on falls and mobility impairments in elderly people at risk: Randomised controlled trial. BMJ 2000;321:994–998.

42) Clemson L, Cumming RG, Kendig H, et al. The effectiveness of a community-based program for reducing the incidence of falls in the elderly: a randomized trial. J Am Geriatr Soc. 2004;52:1487-94.

43) Huang TT, Acton GJ. Effectiveness of home visit falls prevention strategy for Taiwanese community-dwelling elders: Randomized trial. Public Health Nurs 2004;21:247–256.

44) Davison J, Bond J, Dawson P, et al. Patients with recurrent falls attending Accident & Emergency benefit from multifactorial intervention--a randomised controlled trial. Age Ageing. 2005 Mar;34(2):162-8.

45) Gitlin LN, Winter L, Dennis MP, et al. A randomized trial of a multicomponent home intervention to reduce functional difficulties in older adults. J Am Geriatr Soc. 2006;54:809-816.

46) Zidén L, Frandin K, Kreuter K. Home rehabilitation after hip fracture. A randomized controlled study on balance confidence, physical function and everyday activities. *Clin Rehabil* 2008; 22; 1019-1033.

47) Vind AB, Andersen HE, Pedersen KD, et al. The Effect of a program of Multifactorial Fall Prevention on Health Related Quality of Life, Functional Ability, Fear of Falling and Psychological Well-being. A Randomized Controlled Trial. Aging Clin Exp Res. 2009;17.

48) Zidén L, Kreuter M, Frändin K. Long-term effects of home rehabilitation after hip fracture - 1-year follow-up of functioning, balance confidence, and health-related quality of life in elderly people. Disabil Rehabil. 2010;32:18-32.

49) Maki BE, Holliday PJ, Topper AK. Fear of falling and postural performance in the elderly. *J Gerontol* 1991;46:M123–M131.

50) Myers AM, Powell LE, Maki BE, et al. Psychological indicators of balance confidence: relationship to actual and perceived abilities. *J Gerontol A Biol Sci Med Sci*. 1996;51:37–43.

51) Hatch J, Gill-Body KM, Portney LG. Determinants of Balance Confidence in Community-Dwelling Elderly People . Physical Therapy 2003; 83: 1072-1079.

52) McKenna, M. (2001). The application of Tai Chi Chaun in rehabilitation and preventive care of the geriatric population. In Complementary therapies in geriatric practice: selected topics by Ann Burkhardt, Jodi L. Carlson. Harworth Press Inc.

53) Gates S, Fisher JD, Cooke MW, et al. Multifactorial assessment and targeted intervention for preventing falls and injuries among older people in community and emergency care settings: systematic review and meta-analysis. BMJ. 2008 ;19:130-133.

54) Mendes de Leon CF, Seeman TE, Baker DI, Richardson ED, Tinetti ME. Self-efficacy, physical decline, and change in functioning in community-living elders: a prospective study. *J Gerontol Soc Sci.* 1996;51: S183–S190.

Supplementary Data for Age and Aging

Appendix 2:

Searching

Computerized bibliographic databases including MEDLINE, EMBASE, CINAHL, PsycINFO, and Evidence-Based Medicine Reviews (such as the Cochrane Database of Systematic Reviews) were searched for relevant articles published in peer reviewed journals. In addition we hand searched key journals on aging and gerontology. A combination of index/subject terms and text words were utilized when executing the search to maximize the results of related articles. Different subject/MeSH terms (e.g., balance, body equilibrium, self-confidence, or self-efficacy, fear, falls, accidental falls, etc) were combined with keywords and the use of wildcards (e.g., balance adj5 confidence, fall$ adj5 efficacy fear). Additional trials were uncovered through hand archiving; reviewing the table of contents of key journals and the reference lists of articles. The search results were exported to RefWorks (an online research management and collaboration tool) where all duplicate studies were removed.

Appendix 3: Description of 6/30 studies which used a diverse intervention and could not be pooled.

The studies are described individually and effect sizes were calculated. Two studies provided specific standing balance training to relatively small samples of older adults who had not fallen. Standing balance training (2, 20 minute sessions/week for 4 weeks) included standing on a tilting multi-axial platform while interacting with a computerized visual image and playing different games such as skiing and motorcycle racing (Hinman , 2002)[23] [small effect size 0.33 (-0.19 to 0.85)]. The training in the other study included standing on unstable surfaces (air-filled rubber discs) secured in an overhead harness 3 times a week for 5 weeks (Schilling et al., 2009)[10] [large effect size 0.85 (0.04 to 1.66)].

Hip protectors worn by older women with a risk of hip fractures increased their balance confidence significantly compared to a control who did not wear the hip protectors [medium effect size 0.41 (0.07 to 0.76)] (Cameron et al., 2000)[13]. Lee, Hurley, Carew, Fisher, Kiss, & Drummond (2007)[24] provided fallers with a Personal Emergency Response System but this was not found to significantly change their balance confidence [small effect size 0.20 (-0.23 to 0.62)]. An expedited second cataract surgery versus routine surgery (a 'waiting list' within 13 months) was found to increase the balance confidence of women with one successful cataract operation (Foss et al. , 2006)[25] [small effect size 0.24 (-0.01-0.49). Mental imagery training (without exercise) was provided to older adults living in housing cooperatives however this was not found to change their balance confidence [small effect size – 0.20 (0.71 to 1.09)] (Hamel & Lajoie , 2005)[26].

Appendix 4:

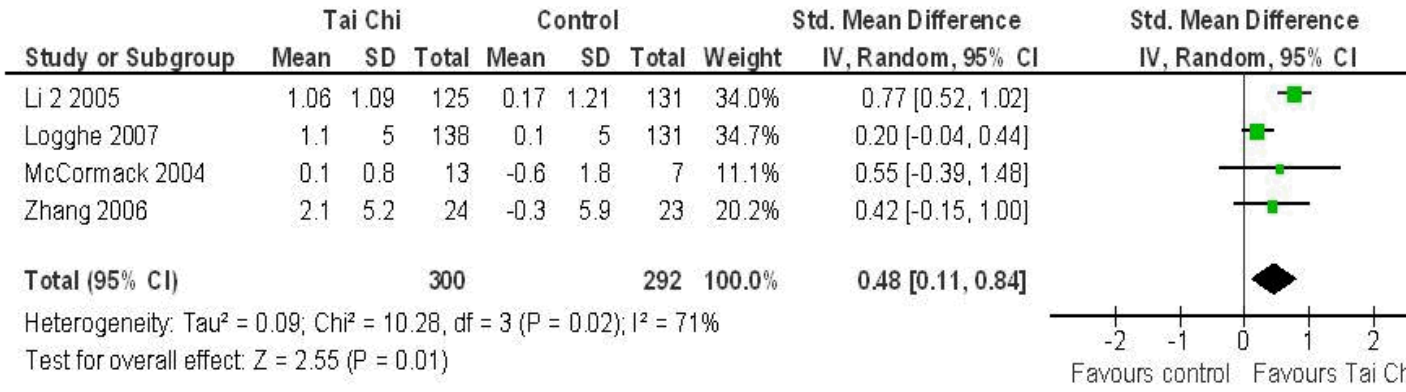

Figure 3: Meta-analysis of Tai Chi aimed at increasing balance confidence (N=292)

Figure 3: Meta-Analysis of Tai Chi aimed at increasing balance confidence (N=300)

Appendix 5: The Total and Specific PEDro Scores of the 30 Trials Included in the Systematic Review and Meta-Analysis

Study First Author, year	Pedro total Score	Q1*	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11

	(/10)											
EXERCISE												
Arai, 2007[11]	**5**	1	1	0	1	0	0	1	0	0	1	1
Campbell, 1997 [27]	**8**	1	1	1	1	0	0	1	1	1	1	1
Williams, 2002 [28]	**3**	1	1	0	0	0	0	0	0	0	1	1
Brouwer, 2003 [29]	**7**	1	1	1	1	0	0	1	1	0	1	1
Lui-Ambrose, 2004 [30]	**5**	1	1	0	1	0	0	0	1	0	1	1
Schoenfelder, 2004 [31]	**6**	1	1	0	1	0	0	1	0	1	1	1
Devereux, 2005 [32]	**8**	1	1	1	1	0	0	1	1	1	1	1
Southard, 2006 [33]	**5**	1	1	0	0	0	0	1	0	1	1	1
Weerdesteyn, 2006 [34]	**4**	1	1	0	0	0	0	0	1	1	1	0
TAI CHI												
Zhang, 2006 [12]	**6**	1	1	0	1	0	0	0	1	1	1	1
McCormack, 2004 [35]	**6**	1	1	1	1	2	2	2	1	1	1	2
Li , 2005 [36]	**7**	1	1	1	1	0	0	1	0	1	1	1
Sattin, 2005 [37]	**6**	1	1	0	1	0	0	1	0	1	1	1
Logghe, 2009 [38]	**8**	1	1	1	1	2	2	1	1	1	1	1
MULTIFACTORAL TREATMENT												
Elley, 2008 [39]	**8**	1	1	1	1	2	2	1	1	1	1	1
Tinetti, 1994 [40]	**6**	1	1	0	1	0	0	1	1	0	1	1
van Haastregt, 2000 [41]	**4**	1	1	0	1	0	0	0	0	0	1	1
Clemson, 2004 [42]	**7**	1	1	1	1	0	0	1	0	1	1	1
Huang, 2004 [43]	**5**	1	1	0	1	0	0	0	1	0	1	1
Davison, 2005 [44]	**8**	1	1	1	1	0	0	1	1	1	1	1
Gitlin,	**8**	1	1	1	1	0	0	1	1	1	1	1

2006 [45]												
Ziden, 2008 [46]	**7**	1	1	1	1	2	2	2	1	1	1	1
Vind, 2009 [47]	**8**	1	1	1	1	0	0	1	1	1	1	1
Ziden, 2010 [48]	**8**	1	1	1	0	1	0	1	1	1	1	1
OTHER INTERVENTIONS												
Schilling, 2009 [10]	**6**	1	1	0	1	0	0	0	1	1	1	1
Cameron, 2000 [13]	**8**	1	1	1	1	0	0	1	1	1	1	1
Hinman, 2002 [23]	4	1	1	0	1	0	0	0	0	0	1	1
Lee, 2007 [24]	**7**	1	1	1	1	0	1	1	0	0	1	1
Foss, 2006 [25]	**7**	1	1	1	1	0	0	0	1	1	1	1
Hamel & Lajoie 2005 [26]	**3**	1	1	0	0	0	0	0	0	0	1	1

Q1: Eligibility criteria were specified. * The score is not included in the Total PEDro score.

Q2: Random Allocation

Q3: Allocation was concealed

Q4: Groups were similar at baseline

Q5: Blinding of all subjects

Q6: Blinding of all therapists

Q7: blinding of all assessors

Q8: measures of key outcome from 85%

Q9: "Intention to treat"

Q10: Between-group statistical comparisons are reported

Q11: Point and variability measures