Program Description

Tai Chi: Moving for Better Balance is designed to improve the strength, balance, and physical functioning of individuals with diminished physical abilities, including older adults and those with Parkinson's disease. The focus of the program is Tai Chi, a nontraditional form of exercise, which is used to help participants improve postural stability, control of body positioning, gait initiation and locomotion, movement symmetry, and coordination; increase the range of motion around ankle joints; and build strength in lower extremities. Tai Chi also can be used to enhance mental health, improve sleep quality, and reduce blood pressure.

The Tai Chi program is community based and implemented through instructor-led group sessions that are held two or three times per week for approximately 6 months, with the ultimate goals of improving participants' functional balance, increasing their mobility, and reducing the incidence of falls. The program consists of a core eight-form routine with built-in exercise variations and a subroutine of eight integrated therapeutic activities, which, collectively, involve a set of simple, continuous, rhythmic, and functional Tai Chi–based actions. The sessions focus on stimulating participants' musculoskeletal and sensory systems via self-initiated movements, such as body weight shifting, unilateral weight-bearing trunk rotation, ankle sways, and coordinated eye-head-hand movements. To meet the specific needs and performance capabilities of the participants, the program includes chair-supported progressions, from completely assisted to unassisted. Participants are also taught exercises that they can perform at home for additional, out-of-class practice. Before delivering the program, Tai Chi instructors must receive training and certification through a 2-day instructional workshop.

Descriptive Information

Areas of Interest	Health and wellness
Outcomes	**Review Date: June 2012** ▸ Functional balance ▸ Mobility ▸ Number of falls
Ages	▸ 26–49 (Adult) ▸ 50–60 (Older adult) ▸ 61–74 (Older adult) ▸ 75–84 (Older adult) ▸ 85+ (Older adult)
Genders	▸ Female ▸ Male
Races/Ethnicities	▸ American Indian or Alaska Native ▸ Asian ▸ Hispanic or Latino ▸ White ▸ Race/ethnicity unspecified

Settings	▸ Community-based organization ▸ Other community settings
Geographic Locations	Urban
Funding/CER Studies	▸ Partially/fully funded by National Institutes of Health ▸ Evaluated in comparative effectiveness research studies
Adverse Effects	No adverse effects, concerns, or unintended consequences were identified by the developer.
Implementation History	Tai Chi: Moving for Better Balance was first implemented in 2001 at the Oregon Research Institute and the Legacy Health System in Eugene, Oregon. Since then, the program has been implemented in more than 10 cities in Oregon, reaching more than 1,000 community-dwelling older adults. In addition to Oregon, the program has been implemented by State-level injury prevention and aging services agencies in California, Colorado, Connecticut, Florida, Maryland, Nebraska, New Hampshire, New Mexico, and New York.
Adaptations	No population- or culture-specific adaptations were identified by the developer.

Quality of Research

Review Date: June 2012

Documents Reviewed

The documents below were reviewed for Quality of Research. The research point of contact can provide information regarding the studies reviewed and the availability of additional materials, including those from more recent studies that may have been conducted.

Study 1

Li, F., Harmer, P., Fisher, K. J., McAuley, E., Chaumeton, N., Eckstrom, E., & Wilson, N. L. (2005). Tai Chi and fall reductions in older adults: A randomized controlled trial. *Journal of Gerontology: Medical Sciences, 60A*(2), 187–194. PubMed abstract available at http://www.ncbi.nlm.nih.gov/pubmed/15814861

Study 2

Li, F., Fisher, K. J., Harmer, P., Irbe, D., Tearse, R. G., & Weimer, C. (2004). Tai Chi and self-rated quality of sleep and daytime sleepiness in older adults: A randomized controlled trial. *Journal of the American Geriatrics Society, 52*(6), 892–900. PubMed abstract available at http://www.ncbi.nlm.nih.gov/pubmed/15161452

Study 3

Li, F., Harmer, P., Fitzgerald, K., Eckstrom, E., Stock, R., Galver, J., … Batya, S. S. (2012). Tai Chi and postural stability in patients with Parkinson's disease. *New England Journal of Medicine, 366*(6), 511–519. PubMed abstract available at http://www.ncbi.nlm.nih.gov/pubmed/22316445

Supplementary Materials

Li, F., Harmer, P., Fitzgerald, K., Eckstrom, E., Stock, R., Galver, J., ... Batya, S. S. (2012). Tai Chi and postural stability in patients with Parkinson's disease [Online supplementary appendix]. *New England Journal of Medicine, 366*(6), 511–519. PubMed abstract available at http://www.ncbi.nlm.nih.gov/pubmed/22316445

Outcomes

Outcome 1: Functional Balance	
Description of Measures	Functional balance was assessed in each study using at least one of two tests: ▸ The functional reach test, which measures the maximal distance a participant can reach forward beyond arm's length while maintaining a fixed base of support in a standing position. Longer reaches indicate better balance. ▸ The single-leg standing test, which measures how long a participant can stand on his or her left or right leg, up to a maximum of 60 seconds. One study conducted this test when the participant's eyes were open and when they were closed, and the other study conducted the test when the participant's eyes were open. For each leg test, three trials were allowed, with scores averaged across the final two trials. Longer times standing on one leg indicate better balance.
Key Findings	In one study, older adults were randomly assigned to the intervention group, which practiced Tai Chi, or the comparison group, which practiced low-impact seated exercises (i.e., stretches, controlled breathing, and relaxation). Both groups met for 1-hour sessions three times per week for 6 months. Data were collected at baseline, 3 months, 6 months (intervention completion), and 6 months after intervention completion. At intervention completion, participants in the Tai Chi group had a longer functional reach ($p < .001$) and longer average times standing on one leg, both left and right with eyes open and closed ($p < .001$ for all four conditions), relative to participants in the comparison group. In another study, older adults were randomly assigned to the intervention group, which practiced Tai Chi, or the comparison group, which practiced low-impact seated exercises (i.e., stretches, controlled breathing, and relaxation). Both groups met for 1-hour sessions three times per week for 24 weeks. Data were collected at baseline, 3 months, and 6 months (intervention completion). At intervention completion, participants in the Tai Chi group had longer average times standing on one leg, both left ($p = .001$) and right ($p < .001$), relative to participants in the comparison group. In a third study, patients with Parkinson's disease were randomly assigned to the intervention group, which practiced Tai Chi; the resistance training comparison group, which practiced exercises for strengthening muscles important for posture, balance, and gait; or the stretching comparison group, which practiced low-impact seated and standing exercises (i.e., stretches, controlled breathing, and relaxation). All groups met for 1-hour sessions twice weekly for 24 weeks. Data were collected at baseline, 3 months, 6 months (intervention completion), and 3 months after intervention completion. From baseline to intervention completion, participants in the Tai Chi group had a greater increase in functional reach relative to participants in the resistance training comparison group ($p < .01$) and the stretching comparison group ($p < .001$).

Studies Measuring Outcome	Studies 1–3
Study Designs	Experimental
Quality of Research Rating (0.0–4.0 scale)	3.5

Outcome 2: Mobility

Description of Measures	Mobility was assessed in each study using at least one of two tests: ▸ The up-and-go test, which measures the time it takes to rise from a chair, walk 3.1 meters (10 feet), return, and sit down. Shorter times indicate better mobility. ▸ The 50-foot speed walk, which measures the time it takes to walk 50 feet. Shorter times indicate better mobility.
Key Findings	In one study, older adults were randomly assigned to the intervention group, which practiced Tai Chi, or the comparison group, which practiced low-impact seated exercises (i.e., stretches, controlled breathing, and relaxation). Both groups met for 1-hour sessions three times per week for 6 months. Data were collected at baseline, 3 months, 6 months (intervention completion), and 6 months after intervention completion. At intervention completion, participants in the Tai Chi group had shorter times relative to the comparison group for both the up-and-go test ($p < .001$) and the 50-foot speed walk ($p < .001$). At 6 months after intervention completion, participants in the Tai Chi group maintained shorter times relative to the comparison group for both the up-and-go test ($p < .001$) and the 50-foot speed walk ($p < .006$). In another study, older adults were randomly assigned to the intervention group, which practiced Tai Chi, or the comparison group, which practiced low-impact seated exercises (i.e., stretches, controlled breathing, and relaxation). Both groups met for 1-hour sessions three times per week for 24 weeks. Data were collected at baseline, 3 months, and 6 months (intervention completion). At intervention completion, participants in the Tai Chi group had a shorter time on the 50-foot speed walk relative to the comparison group ($p = .009$). In a third study, patients with Parkinson's disease were randomly assigned to the intervention group, which practiced Tai Chi; the resistance training comparison group, which practiced exercises for strengthening muscles important for posture, balance, and gait; or the stretching comparison group, which practiced low-impact seated and standing exercises (i.e., stretches, controlled breathing, and relaxation). All groups met for 1-hour sessions twice weekly for 24 weeks. Data were collected at baseline, 3 months, 6 months (intervention completion), and 3 months after intervention completion. From baseline to intervention completion, participants in the Tai Chi group had a shorter time for the up-and-go test relative to participants in the stretching comparison group ($p < .001$); however, times did not differ significantly between the Tai Chi group and the resistance training comparison group.
Studies Measuring Outcome	Studies 1–3

Study Designs	Experimental
Quality of Research Rating (0.0–4.0 scale)	3.6

Outcome 3: Number of Falls	
Description of Measures	Number of falls was assessed using fall counts, as recorded daily in a "fall calendar" by participants, who documented each fall experienced and whether it required medical attention. A fall was defined as landing on the floor or the ground, or falling and hitting objects such as stairs or pieces of furniture, by accident. Fall calendars were collected monthly throughout the intervention and postintervention periods or until a participant withdrew from the study.
Key Findings	In one study, older adults were randomly assigned to the intervention group, which practiced Tai Chi, or the comparison group, which practiced low-impact seated exercises (i.e., stretches, controlled breathing, and relaxation). Both groups met for 1-hour sessions three times per week for 6 months. At 6 months after intervention completion, the average number of falls reported by participants in the Tai Chi group was lower than that reported by participants in the comparison group ($p < .001$). The incidence rate of falls per 100 participant-months of observation was lower for the Tai Chi group than the comparison group (3.16 falls vs. 8.96 falls; $p < .001$). In another study, patients with Parkinson's disease were randomly assigned to the intervention group, which practiced Tai Chi; the resistance training comparison group, which practiced exercises for strengthening muscles important for posture, balance, and gait; or the stretching comparison group, which practiced low-impact seated and standing exercises (i.e., stretches, controlled breathing, and relaxation). All groups met for 1-hour sessions twice weekly for 24 weeks. Over the intervention period, participants in the Tai Chi group had 67% fewer falls than participants in the stretching comparison group (incidence-rate ratio, 0.33; 95% confidence interval [CI], 0.16–0.71) and 53% fewer falls than participants in the resistance training comparison group (incidence-rate ratio, 0.47; 95% CI, 0.21–1.00), even after adjustment for baseline and time-varying covariates. In addition, over the 3 months after intervention completion, participants in the Tai Chi group had fewer falls than participants in the stretching comparison group (incidence-rate ratio, 0.31; 95% CI, 0.14–0.67; $p = .003$) and the resistance training comparison group (incidence-rate ratio, 0.40; 95% CI, 0.18–0.88; $p = .02$).
Studies Measuring Outcome	Studies 1 and 3
Study Designs	Experimental
Quality of Research Rating (0.0–4.0 scale)	3.5

Study Populations

The following populations were identified in the studies reviewed for Quality of Research.

Study	Age	Gender	Race/Ethnicity
Study 1	▸ 61–74 (Older adult) ▸ 75–84 (Older adult) ▸ 85+ (Older adult)	▸ 70% Female ▸ 30% Male	▸ 90% White ▸ 10% Race/ethnicity unspecified
Study 2	▸ 61–74 (Older adult) ▸ 75–84 (Older adult) ▸ 85+ (Older adult)	▸ 81.4% Female ▸ 18.6% Male	▸ 94.9% White ▸ 5.1% Race/ethnicity unspecified
Study 3	▸ 26–49 (Adult) ▸ 50–60 (Older adult) ▸ 61–74 (Older adult) ▸ 75–84 (Older adult) ▸ 85+ (Older adult)	▸ 62.6% Male ▸ 37.4% Female	▸ 91.3% White ▸ 6.7% Hispanic or Latino ▸ 1.0% Asian ▸ 0.5% American Indian or Alaska Native ▸ 0.5% Race/ethnicity unspecified

Quality of Research Ratings by Criteria (0.0–4.0 scale)

Criterion	Ratings		
	Outcome 1	Outcome 2	Outcome 3
Reliability of Measures	3.5	3.6	2.9
Validity of Measures	3.1	3.1	3.1
Intervention Fidelity	3.7	3.7	3.7
Missing Data and Attrition	3.5	3.7	3.7
Potential Confounding Variables	3.7	3.7	3.7
Appropriateness of Analysis	3.9	3.9	3.9
Overall Rating	**3.5**	**3.6**	**3.5**

Study Strengths

The functional balance and mobility measures have good reliability and have been widely used with populations similar to those in the three studies. The Tai Chi program is standardized, and study participants were asked not to engage in any other physical activity during the study period. Attendance across intervention and comparison groups was comparable for all studies. Missing data were reported in all studies, and explanations were provided for participants who withdrew from the studies. For each study, no statistical differences were found between those who discontinued participation and those who remained. Statistical power to detect between-group differences, with appropriate participant attrition estimates, ensured sufficient sample sizes were available to conduct all planned outcome comparisons. Analyses addressed potential confounding variables by controlling for baseline and time-varying covariates. All analyses were appropriate and used an intent-to-treat statistical approach.

Study Weaknesses

Reliability of the fall calendar was unclear since there was no evidence of monitoring to ensure that accurate data were reported by participants, with the exception of injurious falls captured in the medical record. None of the studies discussed face validity or criterion-related validity in regard to functional balance or mobility, although there was some support for the face validity of the fall calendar, which was presented as the gold standard. In all studies, participants were aware of their intervention assignments, which may have introduced bias about the benefits of such exercise.

Readiness for Dissemination

Review Date: June 2012

Materials Reviewed

The materials below were reviewed for Readiness for Dissemination. The implementation point of contact can provide information regarding implementation of the program and the availability of additional, updated, or new materials.

Oregon Research Institute. (2009). *Tai Chi: Moving for Better Balance, step-by-step guide and DVD* (Version 6.2). Eugene, OR: Author.

Oregon Research Institute. (2012). *Tai Chi: Moving for Better Balance: Class teaching fidelity checklist.* Eugene, OR: Author.

Oregon Research Institute. (2012). *Tai Chi: Moving for Better Balance: Teaching timetable—Guidelines.* Eugene, OR: Author.

Oregon Research Institute. (n.d.). *Home-based exercises: An accompanying subroutine for Tai Chi: Moving for Better Balance* (Version 1.0—Draft). Eugene, OR: Author.

Oregon Research Institute. (n.d.). *Mini therapeutic movements: An accompanying subroutine for Tai Chi: Moving for Better Balance* (Version 1.4—Draft). Eugene, OR: Author.

Oregon Research Institute. (n.d.). *Tai Chi: Moving for Better Balance, instruction pamphlet (general teaching guidelines for instructors)* (Version 2.1). Eugene, OR: Author.

Oregon Research Institute. (n.d.). *Tai Chi: Moving for Better Balance, transforming tradition into therapeutic exercise and rehabilitation* (Version 1.0). Eugene, OR: Author.

Readiness for Dissemination Ratings by Criteria (0.0–4.0 scale)

Criterion	Rating
Implementation Materials	3.9
Training and Support	3.3
Quality Assurance	3.8
Overall Rating	**3.6**

Dissemination Strengths

The implementation guide is clearly and concisely written and provides a step-by-step demonstration of each Tai Chi movement. The guide is accompanied by an instructional DVD (used for training and implementation), which features appropriately paced demonstrations for older adults. An instructional document for establishing a Tai Chi routine at home is also available for participants. Instructor training and certification are required by the developer. The general teaching guidelines are concise and provide helpful resources for instructor reference. The 2-day training session concludes with instructor certification, and refresher courses are provided by the developer, which bolster ongoing support and fidelity. Standards and quality assurance for instructors and participants are embedded throughout the program materials; for example, elements of each routine are clearly described in the written materials, depicted in pictures, and modeled in the video. The Class Teaching Fidelity Checklist is user friendly, thorough, and succinct.

Dissemination Weaknesses

Training and refresher courses are limited in that they are offered only by the developer, and program accessibility is limited by the number of trainers available to conduct the training and refresher courses. There is very little information readily available about when trainings occur; instead, interested implementers are encouraged to contact the developer to make training arrangements. No fidelity materials are available for assessing the performance or fall risk outcome of older adults participating in the program.

Costs

The cost information of implementation materials, including off-site training and refresher courses, can be obtained by directly contacting the developer.

Implementation Materials

Item Description	Cost	Required by Developer
Tai Chi: Moving for Better Balance, Step-by-Step Guide and DVD (includes instruction pamphlet)	Contact the developer	Contact the developer
Mini Therapeutic Movements: An Accompanying Subroutine for Tai Chi: Moving for Better Balance	Contact the developer	Contact the developer
Home-Based Exercises: An Accompanying Subroutine for Tai Chi: Moving for Better Balance	Contact the developer	Contact the developer
Tai Chi: Moving for Better Balance, Transforming Tradition Into Therapeutic Exercise and Rehabilitation	Contact the developer	Contact the developer
Tai Chi: Moving for Better Balance: Teaching Timetable and Class Teaching Fidelity Checklist	Contact the developer	Contact the developer
2-day, off-site training (certification included)	Contact the developer	Yes
Off-site refresher courses	Contact the developer	Contact the developer

Other Citations

Li, F., Fisher, K. J., Harmer, P., & Shirai, M. (2003). A simpler eight-form easy Tai Chi for elderly adults. *Journal of Aging and Physical Activity, 11,* 206–218.

Li, F., Harmer, P., Fisher, K. J., Xu, J., Fitzgerald, K., & Vongjaturapat, N. (2007). Tai Chi–based exercise for older adults with Parkinson's disease: A pilot-program evaluation. *Journal of Aging and Physical Activity, 15*(2), 139–151. PubMed abstract available at http://www.ncbi.nlm.nih.gov/pubmed/17556781

Li, F., Harmer, P., Mack, K. A., Sleet, D., Fisher, K. J., Kohn, M. A., … Tompkins, Y. (2008). Tai Chi: Moving for Better Balance—Development of a community-based falls prevention program. *Journal of Physical Activity and Health, 5*(3), 445–455. PubMed abstract available at http://www.ncbi.nlm.nih.gov/pubmed/18579921

Translational Work

Tai Chi: Moving for Better Balance was evaluated in six community centers using the RE-AIM (Reach, Effectiveness, Adoption, Implementation, and Maintenance) framework, which was developed for the systematic planning and evaluation of interventions intended to produce a public health effect. Results showed that the Tai Chi program had a 100% adoption rate at the setting level and a reach of 87% of the study population, which was composed of older adults. All six centers implemented the intervention with good fidelity, and participants had significant improvements in health-related outcome measures. At the completion of the evaluation, five centers continued to offer a Tai Chi class, and the other center was waiting for an available instructor.

Translational efforts are under investigation in three randomized controlled trials supported by the Centers for Disease Control and Prevention (CDC), the National Cancer Institute (NCI), and the National Institute on Aging (NIA). In the CDC-supported study, investigators are determining whether an evidence-based Tai Chi fall prevention program can be disseminated through health care provider referrals of older patients who are at risk of falling. In the NCI-supported study with cancer patients, researchers are examining the effects of Tai Chi and strength training on improving balance and muscle strength and reducing the risk of falling. In the NIA-supported study, investigators are working to determine whether an evidence-based Tai Chi fall prevention program can be disseminated through a broad spectrum of community-based senior service providers that often cater to low-income, underserved, community-dwelling older adults at risk of falling. The impact of these translations will be determined once evaluation efforts have been concluded and findings have been published.

The American Geriatric Society and the British Geriatric Society recommend Tai Chi as a fall prevention exercise program for older adults, and the Tai Chi program is recommended by the Administration on Aging and CDC. Also, 10 States have implemented the Tai Chi program through State-level injury prevention and aging services agencies.

Site With Translational Work	Articles Describing Site's Translational Work, by Category					
	Planning/ Partners	Adoption	Reach/ Recruitment	Implementation	Effectiveness	Maintenance
6 community centers	—	Article 1	Article 1	Article 1	Article 1	Article 1

Article Number	Article Reference
1	Li, F., Harmer, P., Glasgow, R., Mack, K. A., Sleet, D., Fisher, K. J., … Tompkins, Y. (2008). Translation of an effective Tai Chi intervention into a community-based falls-prevention program. *American Journal of Public Health, 98*(7), 1195–1198. PubMed abstract available at http://www.ncbi.nlm.nih.gov/pubmed/18511723

Contacts

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