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Effects of a video guided T'ai Chi group intervention on center of balance and falls efficacy: A pilot study

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Abstract

This pilot study evaluated effects of a video-guided T'ai Chi group intervention on center of balance (COB) and falls efficacy, using a one arm, pre/post design. Thirty-two participants began the study, 17 completed pre- and post-testing and 15 were lost to follow-up. Outcomes were compared for the 17 participants who completed pre- and post-testing and subgroups based on session attendance. Irrespective of session attendance, participant COB scores improved. There was a significant negative correlation between number of sessions attended and pre and post scores on the fall efficacy (fear of falling) measure, indicating those with higher fear of falling were less likely to complete the study. Older participants were also less likely to continue participation. Findings indicate potential benefits of T'ai Chi in improving COB (a fall risk factor) among community-dwelling older adults. However, those with greater potential benefit (higher fear scores, older participants) were less likely to continue participation.

Keywords

T'ai Chi; Fall prevention; Center of balance; Falls efficacy; Older adult

Background

Falls are a major public health problem for older adults. The Centers for Disease Control estimates that approximately 30e45% of community dwelling adults over the age of 65 fall each year.¹ Among older adults (65 or older) falls are the leading cause of traumatic death, non-fatal injury and hospital admission for traumatic injury.^{1,2} In 2010, 2.3 million non-fatal fall-related injuries among older adults were treated in emergency departments and more than 662,000 of these patients were hospitalized. The direct cost of these injuries was estimated to be between 19.2 and 30.0 billion dollars per year; a substantial financial burden.^{1,2}

Risk factors for falling in community dwelling older adults are multifactorial.^{1–3} Most falls are related to environmental factors in combination with the inability to maintain balance or

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stability when attempting to navigate.^{1–5} The inability to maintain stability is associated with age-related changes in sensory perception (vision and hearing) and the musculoskeletal (gait and balance changes) and central nervous systems (CNS), (postural hypotension).^{1–5} Deficits in vision and hearing may lead to a misinterpretation of the environment. Deconditioning related to musculoskeletal disorders or inactivity can play a role in postural instability.^{1–5} In addition to age-related changes in the CNS (e.g., slower reaction time), postural hypotension is a common adverse effect of medications.^{1–5}

Falls efficacy is defined as “perceived self-efficacy (confidence) at avoiding falls during essential, nonhazardous activities of daily living.”^{6,7} Low fall efficacy, or fear of falling, is a problem reported by many older adults, regardless of having experienced a fall.^{6,7} Fear of falling can be considered a proxy self-efficacy measure that correlates to fall events.⁸ Fear of falling can impact an older adult’s quality of life by increasing risk for decreased mobility, deconditioning, muscle atrophy and/or poor balance and gait along with self-imposed social isolation.^{6,7} The resulting cycle of fear, self-imposed activity restriction and increased frailty may keep those who most need a fall prevention intervention from participating.^{6,7}

A variety of strategies are recommended to reduce the incidence falls in older adults, including annual medication reviews and vision screens, along with making homes safer by removing hazards (loose rugs) and installing assistive devices such as grab bars and toilet lifts.^{1–6,9,10} Exercise, performed on a regular basis, is increasingly recognized as an important means to reduce fall risk.^{1–6,9,10} However, participation in routine exercise may be challenging for some older adults.

T’ai Chi, an ancient Chinese martial art, is thought to enhance awareness of body position, alignment and improve range of motion.^{4,11} There are many forms of T’ai Chi, all grounded in the underlying principle of continuous slow movement of every part of the body.^{4,11} The presumed benefit relates to improved perception of center of balance (COB), a complex process that is necessary to facilitate movement, maintain posture and recover equilibrium (i.e., postural stability), and is directly related to falls in older adults.^{3–6,9–12}

A number of studies provide evidence that T’ai Chi can be an effective strategy to reduce fall risk among older adults.^{5,11,13–15} When findings were examined in systematic reviews and meta-analyses, several conclusions emerged. Older adults who practice T’ai Chi can reduce their risk of falling⁵ as well as their fear of falling.¹³ In comparison to other interventions, T’ai Chi appears to be the most effective in reducing fear of falling in community dwelling older adults. However, not all individuals benefit equally; healthier older adults appear to gain more benefit from T’ai Chi than frail individuals.¹¹ Studies using a non-exercise control group report a significant decrease in fall rates and fear of failing and improved COB in those performing T’ai Chi.¹⁵ However, studies that compared outcomes to various other types of exercise found no difference regarding balance measures. When studies examined in a meta-analysis were divided into subgroups based on differences in the frequency and dosage of T’ai Chi, there appeared to be differences in effectiveness. However, the authors of the meta-analysis (Logghe and associates, 2010) noted that it was difficult to summarize the T’ai Chi literature since studies vary in regard to delivery format, practice frequency, and outcomes measured. Therefore, the authors offered no recommendations regarding the most

appropriate frequency or dosage.¹⁵ Additionally; there is wide heterogeneity in sample size, participant age and demographic characteristics in the T'ai Chi literature. Despite these limitations, there is consistent evidence of benefit among older adults who practice a T'ai Chi exercise intervention.^{5,11,13–15}

Self-efficacy theory proposes that individuals have the ability to change behavior and recognize the link between personal health practices and choices that influence health.^{16–18} Self-efficacy theory is an effective guide to change behavior in older adults, especially relating to exercise behavior. According to Bandura, there are four major sources of self-efficacy: mastery experiences (performing a task successfully), social modeling (witnessing others successfully completing a task), social persuasion (verbal encouragement from others) and psychological responses (moods, physical reactions, stress level).^{16–18} Applying this theory, one can expect that those individuals with higher self-efficacy, and a greater belief in a positive outcome, will be more likely to attempt a behavior.^{16–18} We therefore reasoned that T'ai Chi exercises, offered in a group format might promote feelings of mastery in regard to exercise participation. This type of group program could also provide social modeling and social persuasion in the form of modeling and verbal encouragement from other participants. These sources of self-efficacy may increase intervention participation and thereby improve COB and reduce fall risk.

The primary goal of this pilot study was to evaluate the effect of a 12-week video guided T'ai Chi exercise program on COB and falls efficacy in healthy older adults in a community-based Senior Center. It was hypothesized that the video guided T'ai Chi exercise classes would improve COB and decrease fear of falling. An additional aim was to explore participant characteristics associated with positive benefit.

Methods

Design

We used a pretest-posttest, 1-arm (no control group) study design. After obtaining approval from the two Senior Centers used for data collection and the University Institutional Review Board, flyers were posted and study availability announced to older adults attending the centers. The flyers instructed interested individuals to call a number or provide information to the Senior Center Director for research team contact. Dates were also provided when a research team member would be available at the Senior Centers to provide study information. A research team member contacted all individuals who expressed interest, explained the study, and obtained verbal permission to perform eligibility screening. Recruitment and eligibility screening occurred over a four week period. All participants provided signed informed consent. They were encouraged to attend all sessions.

Sample and setting

Participants included a convenient (voluntary) sample of 32 adults who attended day programming at a two Senior Centers in rural Pennsylvania. Senior Centers were chosen as the setting for the intervention because they attract a population of community dwelling adults over the age of 60 who gather for nutritious low cost meals, games, socialization and

various exercise classes. This setting offered a convenient site for the intervention and access to free or low cost equipment necessary for participation (e.g., television, Wii™ Game console). Participant inclusion criteria were: 1) age >60 years (to avoid excluding Senior Center members); 2) ability to complete the “Get up and go test”¹⁹ which evaluated the participant’s ability to get out of a chair independently (to evaluate mobility) and 3) not at high risk for falls based on selected items in the Hendrich II Fall Risk Model (HIIFRM).¹⁹ Potential participants were excluded if they acknowledged experiencing dizziness or vertigo, were taking benzodiazepines or antiepileptic medications, or could not rise from a chair unassisted.

Intervention

The T’ai Chi program used in this study was Yang Style 5-Form; delivered via a video that was developed and evaluated in a National Institutes of Health funded study designed to determine the effects of T’ai Chi on balance confidence, balance performance, strength, and mobility in females at risk for developing osteoporosis.²⁰ Permission was obtained to use the video for this project. Three exercise sessions, each 45 min in length, were scheduled 3 times a week for 12 weeks (36 total sessions). Exercise sessions took place in the common meeting area or an activity room at the Senior Center. Each participant was given a calendar with a schedule of the exercise sessions. Dates and times of the exercise sessions were also published in the Center’s monthly activity calendar.

After baseline and demographic data were obtained, participants were instructed in use of the Tai Chi video and, if desired, given a copy of the video for home use. During the first 2 weeks, participants learned and practiced the T’ai Chi forms using video section II, “Instruction in Yang Style 5-Form.” This section of the video slowly and repeatedly reviewed each of the motions required in the 5-forms. For the next 10 weeks, participants followed the video section III, “Performance in standing.” This section of the video included a warm up (20 min) followed by Yang Style 5-form T’ai Chi repeated 7 times (21 min) and a cool down (4 min) for a total of 45 min of exercise.

A member of the research team was present at each exercise session to take attendance and monitor for safety. The research team member participated in the exercise with the participants and provided encouragement but did not lead the exercise. The research team member did not have training in T’ai Chi. If participants stopped attending sessions, attempts were made to contact them by telephone to ask the reason for stopping and gently encourage continued participation.

Measures

*Hendrich II Fall Risk Model*¹⁹ was used to screen for study eligibility. The HIIFRM is a valid and reliable fall screening tool used in the inpatient setting (74.9% sensitivity and 73.9% specificity).¹⁹ The original model contains 7 risk factors: confusion/disorientation/impulsivity; symptomatic depression; altered elimination; dizziness or vertigo; maleness; any prescribed antiepileptic or benzodiazepine; and the “get up and go” test.¹⁹ The HIIFRM was modified for use in community dwelling older adults by removing risk factors that had

greater applicability to hospitalized patients (i.e., confusion/disorientation/impulsivity, symptomatic depression, altered elimination) or were not study exclusion criterion (being male). The modified screening instrument contained 3 of the original items from the HIIFRM. The first item asked potential participants to self-report the names of medications they were taking (verbally or written) and a research team member determined if the drugs were benzodiazepines or antiepileptics. Two additional items from the HIIFRM determined if potential participants experienced dizziness or vertigo.

Center of balance (COB) was assessed using a Wii Balance Board™ (WBB) (Nintendo, Redmond, Washington) pre and post-intervention. COB can be measured quantitatively using a force platform. This equipment is considered the “gold standard” but is large and expensive.²¹ The Wii BalanceBoard™ (WBB) offers a low cost, portable alternative to the force platform since it also provides a quantitative measure of COB.^{22–24} Prior studies indicate that, in comparison with the force platform, the WBB is reliable and valid with an intra-class correlation coefficient (ICC) of 0.77e0.89 and very high Pearson’s correlation coefficients ($r = 0.999$).^{22–24} When evaluating COB, participants were asked to follow the steps outlined in Table 1. The average COB was computed pre and post-intervention. Ideal COB is 50% left and 50% right; an even COB.^{22–24}

Fall Efficacy Scale-International (FES-I) scores were used to assess fear of falling pre- and post-intervention. The FES-I, a valid and reliable tool to measure fear of falling in community-dwelling older adults,²⁵ measures concern regarding participating in 16 activities of daily living such as going up or down stairs or taking a bath or shower, using a four-point Likert scale (1 = not at all concerned to 4 = very concerned). Scores from the 16 items are summed and range from 16 to 64, with higher scores indicating more fear of falling.²⁵ In the present sample, Cronbach’s alpha of the FES-I was 0.96.

Demographic data were collected by self-report at baseline and included age, gender, race, educational level and marital status. In addition, participants were asked about their customary amount, type and location of physical activity (home, gym or Senior Center). At study completion, participants self-reported if they used the T’ai Chi exercise video at home and the mode of transportation (public versus private) used to get to the Senior Center.

Data analysis

Data were analyzed using the Statistical Package for the Social Sciences v21 (SPSS v 21). Participants were encouraged to attend all exercise sessions; however, there were variable numbers of sessions completed by the participants. Seven participants (21.9%) completed between 12 and 27 exercise sessions (1 sessions/week) and returned for post-testing. An additional 10 participants (31.2%) completed 7 sessions during the first 3 weeks of the program and did not return until post-testing. The remaining 15 participants (46.9%) completed between 1 and 17 sessions but did not return for posting and were lost to follow-up. Reasons (obtained through telephone contact) were: health issues (n 6); schedule conflicts (n = 1) or unable to contact (n = 8). To further illuminate benefit (or lack thereof) from this intervention, post hoc, three subgroups were formed consisting of those who

attended 7 sessions ($n = 10$), those who attended 12 sessions and those lost to follow-up ($n = 15$) (Fig. 1).

One-way multivariate analysis of variance (MANOVA) was employed for comparisons among all participants that provided baseline (pre intervention) data for age and scores on the FES-I and COB. Comparisons were made between the two subgroups that provide pre- and post-test data using 2 2 repeated measures MANOVA. The relationship between FES-I scores and number of sessions attended was examined using Pearson's correlation coefficients. Statistical analysis was completed using de-identified, coded data.

Results

Thirty-eight older adults were screened for study eligibility and 35 met inclusion criteria and signed informed consent. Reasons for exclusion were: less than 60 years of age ($n = 2$) and endorsed being dizzy. Three participants who signed consent did not report demographic data, complete pre-testing and/or attend any exercise sessions. This resulted in a final sample of 32 older adults who began the 12-week T'ai Chi exercise program.

The typical participant was 73 years of age, female, Caucasian, widowed and educated at the high school level. The majority of participants stated they exercised at home two or fewer days a week and used private transportation to reach the Senior Center (Table 2). There were no significant differences among the three subgroups for the FES-I or COB scores. However, age differed significantly ($p = 0.024$). Those who completed 12 sessions were younger (66.9 ± 4.6 years) than those who were lost to follow-up (76.5 ± 7.8 years).

Change in COB scores

When comparison were made between scores for the two subgroups who completed post-testing, there were no significant between group differences for group ($F = 1.301$; $df = 5, 11$; $p = 0.331$), time (pre/post changes) ($F = 1.09$; $df = 5, 11$; $p = 0.417$) or for the interaction effect of groups over time ($F = 0.803$; $df = 5, 11$; $p = 0.570$) for the four variables included in COB analysis (EOL, EOR, ECL, ECR) when analyzed using MANOVA. However, univariate analysis of variance revealed a significant change in EOR ($p = 0.044$) and EOL ($p = 0.035$) scores pre-to post-intervention, irrespective of attendance. EOR scores increased 3.0% and EOL scores decreased 3.2% from pre-to post-measurement, bringing participants' COB closer to the desired center of balance (50% right and 50% left) (Table 3). Although significant changes were found, it is important to note that both measures were underpowered at 0.54 (EOR) and 0.58 (EOL), most likely due to the small sample size.

Change in FES-I scores

On pre-testing, FES-I scores were higher (i.e., stronger fear of falling) for those completing 7 sessions compared to those completing 12 sessions (Fig. 2). When pre- and post-test scores were compared, there was a slight decrease in FES-I scores for those who attended 7 sessions (30 ± 14.5 vs. 29 ± 11.9 , respectively). However, the change was not significant ($p = 0.056$). Scores for those who attended 12 sessions were unchanged (19 ± 1.8 vs. 19.1 ± 1.7 , respectively). There was a moderately high, significant negative correlation between number of sessions attended and FES-I scores on pre-testing ($r = -0.682$, $p = 0.003$) and post-testing (r

= -0.723, $p = 0.001$), indicating greater attrition for those who perceived greater fear of falling. Age was found to be negatively, but not significantly, correlated with the number of sessions attended ($r = -0.45$; $p = 0.07$).

Intervention fidelity

Treatment fidelity was ensured by using a protocolized videotaped, T'ai Chi exercise intervention designed specifically for research with community-dwelling older adults. Use of this videotaped exercise intervention protocol precluded need for on-going interventionist training and monitoring (to detect prevention drift from the protocol).²⁶ Consistent delivery of the intervention was ensured by having a trained research team member present at every exercise session to observe participant safety and ensure the intervention was delivered as intended.²⁶ Evaluation of treatment receipt was assessed by de-identified attendance sheets. Treatment enactment focused on the degree to which subjects demonstrated the behavior changes sought by the exercise intervention (e.g., improved COB and FES-I scores).²⁶ As noted above, there were no significant changes in COB using multivariate analysis. Univariate analysis showed statistically significant differences; however, they were underpowered. FES-I scores did not change significantly. Program acceptability (treatment enactment) was evaluated by examining rates of agreement to enroll in the study and exercise session participation rates. Participation rates were poor and participants most in need, had the lowest attendance.

Discussion

This pilot study was an attempt to translate current evidence of the positive effects of T'ai Chi exercise in a low cost manner with older adults residing in the community. The results of this study will be used to develop larger and more rigorous studies utilizing T'ai Chi with older adults.

Senior Centers attract a population of community dwelling adults over the age of 60 who gather for various activities. In-person T'ai Chi instruction is difficult to incorporate in this setting, due to the need to employ qualified personnel (e.g., instructors and spotters). However, the same instruction can be provided using video-based instruction. We reasoned that this format might serve as a low cost (or free) alternative to paid exercise classes. Additional potential advantages to video-guided T'ai Chi exercises concern consistency in delivery and popularity of this method of instruction. The exercise DVD industry reported growth of 11.2% and \$264 million in revenue from 2007 to 2012. According to industry reports, 20% of consumers are older adults.²⁷ Studies evaluating at home and group DVD-led exercise support the potential benefits of DVD-led exercise in older adults.^{28,29} There are also potential negative aspects to video guided exercise instruction, including lack of individualization and inability to correct movements or provide personalized encouragement.^{28,29}

The T'ai Chi exercise intervention had positive effects on COB among older adults since all participants showed improvement in COB scores. Yet, this study did not have sufficient power to show significant changes in COB scores. In the future, it would be important to

recruit a sufficient sample size to test the hypothesis of interest. Also, it would be important to determine the appropriate “dose” of video-based T'ai Chi instruction for COB correction, as well as the amount of practice necessary to maintain an even COB after age 60.

The T'ai Chi exercise intervention did not significantly impact participant FES-I (fall efficacy or fear of falling) scores. Participants who completed the most exercise sessions had lower FES-I scores at initiation of the study (indicating less fear of falling), leaving little room for improvement. Participants endorsing the strongest fear of falling (higher FES-I scores) tended to complete few session or were lost to follow up. This finding reinforces the notion that fear of falling results in a cycle of fear, self-imposed activity restriction, and increased frailty that may keep those who most need fall prevention intervention from participating.^{6,7} Future studies need to be specifically designed to improve fall self-efficacy (fear of falling) among older adults.

Although the Wii Balance Board™ has been found to be a valid and reliable too for measuring COBI,^{22–24} no studies were identified that used this device in community dwelling individuals over the age of 60 years. Our methodology used the commercially available Wii Console™, WBB™ and the WiiFit™ game in an unmodified fashion. Participants tolerated standing on the WBB™ without difficulty and appeared to enjoy the activity. Scores were easily recorded from the video display which provided participants with a visual image of their COB. We did not conduct testing with participants blinded to this display and awareness of body position may have impacted COB scores (i.e., they may have corrected their balance based on the data displayed).

In the current study, 92% of eligible older adults agreed to participate. This is not supported in the literature suggesting that only 10–20% of eligible older adults will choose to participate in a fall prevention program.^{5,30} Over the 12-week study period, we lost more than three-quarters of the sample to attrition with nearly half of participants completing 3 or fewer sessions. This is an issue when considering treatment fidelity related to enactment or behavioral change. The maximum number of sessions was attended by only one participant. This finding is supported in the literature; authors frequently report challenges in recruiting and maintaining participation in exercise interventions with older adults.^{5,6,30} Notes made by research personnel at the exercise programs reveal that several participants asked if having a “live” instructor was possible. It would be important to train interventionists in future studies using video-guided T'ai Chi since many participants stated they found the video “difficult” to follow and were unsure if they were “performing the forms correctly.” Attrition rates in the current study suggest that live instruction (coaching) may be the preferred method of T'ai Chi delivery to maintain involvement of older adults. Another factor that may have influenced attrition was the time of year (October through January) and winter weather conditions. Two sessions were canceled due to inclement weather. Lastly, there were often several activities taking place simultaneously at the Senior Centers, forcing participants to choose between activities.

Several limitations of the study must be considered. Given the small sample size, study findings should be cautiously viewed. The sample was homogenous (Caucasian and female), and attrition was high. This limits the generalizability of findings. The Senior Centers

chosen for this study did not attract many men or older adults of different races.³¹ The study sites had a large population of adults over the age of 60 years since they make up almost 1/5 of the local population. Considering the lack of racial diversity in the sample, and high attrition levels, Senior Centers may not be the best place to recruit study participants. Notably, attrition was higher among individuals with greater fear of falling and advanced age. Such individuals, although more in need of the intervention, may be unlikely to visit Senior Centers on a regular basis.³¹

In future studies of exercise programs among community-dwelling older adults, it will be advantageous to enroll a larger, more racially diverse sample, use a more rigorous study design, and a variety of recruitment strategies. It will also be important to blind the participants from the COB display in future studies using the Wii Balance Board™ since the participants' ability to read the display may impact study results. It may also be beneficial to revise the exercise program to provide slower and repeated instruction with a trained coach on-site to provide feedback on the participant's technique. If such a program is efficacious in improving COB, it may eventually serve as an evidence-based fall prevention strategy for older adults residing in the community. Despite these limitations, our results suggest that video guided T'ai Chi is a low cost exercise intervention that may have benefit in improving COB in community dwelling older adults.

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Fig. 1.
Number of participants who were screened, enrolled, completed the study and lost to follow-up.

Fig. 2.

Comparison of average Falls Efficacy Scale-International (FES-I) scores pre and post-intervention. Possible range for FES-I scores are 16-64. Participants who completed 7 sessions had higher FES-I scores initially (more fear of falling) than those who completed 12 sessions. Scores were unchanged for participants who completed 12 sessions and lower, but not significantly, for those who completed 7 sessions.

Table 1

Steps used to obtain center of balance measure using the Wii BalanceBoard™.

1	"Trial-body test" selected from the WiiFit™ Plus video game main menu.
2	Two staff members stood near participants during the assessment and a chair was placed behind the participant as safety measures.
3	Participants instructed to: <ul style="list-style-type: none">a. Step on the WBB™.b. Keep their hands on hips and remain as still as possible.c. Inform study staff if experiencing dizziness or the desire to stop.
4	Two balance tasks were performed in the same manner prior to beginning the intervention and immediately following study completion: <ul style="list-style-type: none">a. Double limb standing with eyes open.b. Double limb standing with eyes closed.c. Each task was performed 3 times with eyes open and 3 times with eyes closed with a 30 s rest between each task while the system was reset.
5	Scores were recorded from the screen of the television, which depicted the COB score as a left sided and right sided numerical percentage out of 50%.
6	The average of the 3 scores was used for analysis.

Table 2

Participant demographic data.

Characteristic	Total sample (n = 32)	Attended 7 sessions (n = 10)	Attended 12 sessions (n = 7)	Lost to follow-up (n = 15)
Gender (n, % female)	29 (90.6%)	10 (100%)	5 (71.4%)	14 (93.3%)
Age, years (<i>M, SD</i>) ^a	73.3 ± 8.6	74.6 ± 7.8	66.9 ± 4.6	76.5 ± 7.8
Race (n, % Caucasian)	32 (100%)	10 (100%)	7 (100%)	15 (100%)
Marital status (n, %)				
Married	10 (31.3%)	2 (20.0%)	6 (85.7%)	2 (13.3%)
Divorced, separated	3 (9.4%)	0	0	3 (20%)
Never married	6 (18.8%)	1 (10.0%)	1 (14.3%)	4 (26.7%)
Widowed	13 (40.6%)	7 (70.0%)	0	6 (40%)
Education level (n, %)				
High school	19 (59.3%)	7 (70.0%)	4 (57.1%)	8 (53.3%)
Vocational/technical	6 (18.8%)	0	1 (14.3%)	5 (33.3%)
Bachelor degree	3 (9.4%)	1 (10.0%)	1 (14.3%)	1 (6.7%)
Master's or higher	4 (12.5%)	2 (20.0%)	1 (14.3%)	1 (6.7%)
Currently exercise (n, %)	24 (75%)	6 (60.0%)	6 (85.7%)	12 (80%)
Exercise frequency (n, %)				
0–2 days/week	15 (46.9%)	7 (70.0%)	2 (28.6%)	6 (40%)
3–5 days/week	11 (34.4%)	1 (10.0%)	5 (71.4%)	5 (33.3%)
6–7 days/week	6 (18.8%)	2 (20.0%)	0	4 (26.7%)
Exercise location ^b (n, %)				
At home	15 (46.9%)	2 (20.0%)	5 (71.4%)	8 (53.3%)
Fitness center	2 (6.3%)	0	1 (14.3%)	1 (6.7%)
Senior activity center	8 (25%)	5 (50.0%)	1 (14.3%)	2 (13.3%)
Transportation ^b (n, %)				
Private	16 (50%)	9 (90.0%)	7 (100%)	NA ^c
Public	1 (3.1%)	1 (10.0%)	0	NA ^c
Used video at home ^b (n, %)	2 (6.3%)	1 (10.0%)	1 (14.3%)	NA ^c

Characteristic	Total sample (n = 32)	Attended	7 sessions (n = 10)	Attended	12 sessions (n = 7)	Lost to follow-up (n = 15)
Reason for quitting ^b (n, %)						
Too difficult	2 (6.3%)	2 (20.0%)	0	0		0
Schedule conflict	3 (9.4%)	2 (20.0%)	0	0		1 (6.7%)
Illness/Health issue	8 (25%)	4 (40.0%)	0	0		4 (26.7%)
Did not like T'ai Chi	2 (6.3%)	2 (20.0%)		0		0

^aSubjects lost to follow-up significantly older than those who completed 12 sessions ($p = 0.024$).

^bBecause of missing data, totals may not equal enrollment.

^cNA = Data not available.

Table 3

Center of balance measures pre and post-intervention.

Group		
Attended 7 sessions (n = 10)		Attended 12 sessions (n = 7)
Mean (SD)		Mean (SD)
Center of balance measures		
Eyes open right ^a		
Pre	48.0 (6.0)	48.6 (2.2)
Post	52.2 (8.0)	50.5 (3.1)
Eyes open left ^b		
Pre	51.9 (6.0)	51.3 (2.2)
Post	47.7 (8.0)	49.0 (3.9)
Eyes closed right		
Pre	49.2 (5.2)	47.2 (3.1)
Post	51.2 (8.4)	49.9 (1.8)
Eyes closed left		
Pre	50.9 (5.4)	52.7 (3.1)
Post	48.8 (8.4)	50.1 (1.8)

^a
p = .044.^b
p = .035.