Effect of a 10-Week Traditional Dance Program on Static and Dynamic Balance Control in Elderly Adults

Giorgos Sofianidis, Vassilia Hatzitaki, Stella Douka, and Giorgos Grouios

This preliminary study examined the effect of a 10-wk traditional Greek dance program on static and dynamic balance indices in healthy elderly adults. Twenty-six community-dwelling older adults were randomly assigned to either an intervention group who took supervised Greek traditional dance classes for 10 wk (1 hr, 2 sessions/week, n = 14), or a control group (n = 12). Balance was assessed pre- and postintervention by recording the center-of-pressure (COP) variations and trunk kinematics during performance of the Sharpened-Romberg test, 1-leg (OL) stance, and dynamic weight shifting (WS). After practice, the dance group significantly decreased COP displacement and trunk sway in OL stance. A significant increase in the range of trunk rotation was noted during performance of dynamic WS in the sagittal and frontal planes. These findings support the use of traditional dance as an effective means of physical activity for improving static and dynamic balance control in the elderly.

Keywords: aging, training, dance exercise, postural control, social interaction

Increased incidence of falling has been identified as one of the principal contributing factors to morbidity and mortality in the elderly (Tinetti, 2003). Women have been shown to fall more often than men (Wilkins, 1999), with their incidence of hip fracture being twice that of men. More important, fear of falling that develops as a consequence of a fall seriously limits participation in physical activity (Myers et al., 1996). Growing research evidence, on the other hand, stresses the importance of physical activity in delaying degeneration and confirms that the aging neuromuscular system maintains its responsiveness and plasticity in response to adequate exercise regimens (Macaluso & De Vito 2004; Vandervoort, 2002). Older adults experience well-established benefits from combined exercise interventions aimed at improving general agility, muscle strength, cardiovascular capacity, and flexibility (Campbell et al., 1997; Morse et al., 2005). Nevertheless, it has been reported that generic exercise interventions have limited success at improving particular functional aspects of static and dynamic balance control and

The authors are with the Dept. of Physical Education and Sport Sciences, Aristotle University of Thessaloniki, 546 24 Greece.
subsequently attenuating fall incidence (Carter, Kannus, & Kahn, 2001; Frank & Patla, 2003). Furthermore, the high physical impact of such exercise interventions could impose additional barriers for older people who participate in physical activity (Ryan, Pratley, Elahi, & Goldberg, 1995).

Computerized balance training based on the use of biofeedback (Rose & Clark, 2000; Sihvonen, Sipila, & Era, 2004) and Tai Chi (Tsang & Hui-Chan, 2004) has been suggested as an alternative, more targeted means of improving balance function in the elderly. Tai Chi training has been shown to be effective in reducing postural sway under conditions of increased reliance on vestibular input, as well as in directional control of the limits of stability (Tsang, Wong, Fu, & Hui-Chan, 2004). Cross-sectional studies also suggest that elderly individuals with long experience in Tai Chi have better balance control in both static (Hong, Li, & Robinson, 2000) and dynamic (Tsang & Hui-Chan, 2003) test conditions and have a lower incidence of multiple falls (Wolf et al., 1996) than their sedentary counterparts. However, when Tai Chi training was compared with computerized balance training, Tai Chi practitioners did not improve their postural stability more than the elderly participants who received computerized balance training (Wolf et al.).

Dance is a form of physical activity generally recommended for maintaining dexterity, muscle tone, and coordination. In a study on young cross-country skiers, dance exercise was shown to improve range of motion, joint mobility, muscle flexibility, speed, and agility while reducing back pain (Alricsson, Harms-Ringdahl, Eriksson, & Werner, 2003). Physical activity based on dance has been proposed as an effective means of improving balance function and reducing fall incidence in the elderly (Shigematsu et al., 2002; Federici, Bellagambam, & Rocchi, 2005). A 12-week (1 hr, three sessions/week) dance-based aerobic-exercise program significantly improved single-leg standing, functional reach, and walking time in a group of healthy older women (Shigematsu et al.). In addition, a 3-month (1 hr, two sessions/week) program of Caribbean dances was effective in improving balance indices in a cohort sample of middle aged (58–68 years) adults (Federici et al.). It should be noted, however, that the Caribbean dance intervention also included joint-mobility, strength, coordination, and balance exercises, and thus it is quite difficult to attribute the observed benefits of that study to the influence of dance practice alone.

In the current study, we investigated the impact of a short-term (10-week) Greek traditional-dance-based program on static and dynamic balance performance of elderly adults. We selected Greek dance for two main reasons. First, it involves self-imposed perturbations that substantially challenge the postural-control system (i.e., steps and activities such as single-limb standing, trunk flexion and extension, and forward and backward leaning). Second, it ensures high levels of involvement because it is a pleasant and popular form of physical activity among Greek older adults that allows for social interaction, artistic expression, and cultural development. The psychosocial benefits of traditional Greek dance have been shown in a study that reported improved perception of life in older women of Greek origin participating in Greek dance classes (Konstantinidou & Harahousou, 2004). Nonetheless, no systematic analysis regarding the influence of Greek traditional dance on the aging balance-control system can be found in the relevant literature. To this end, we implemented a progressive multidance
training program and examined the changes in static and dynamic balance before and after 10 weeks of practice. We determined the magnitude of change in dynamic and kinematic postural-sway measures during performance of two static and two dynamic balance tasks. We hypothesized that dance training would elicit significant improvements in static and dynamic postural-sway measures.

Methods

Participants

Twenty-six community-dwelling elderly adults (mean age 70.89 ± 5.67 years; 20 women, 6 men) were recruited from five social-recreational community centers for seniors. None of the participants had prior physical practice or experience in traditional Greek dances. They were independent in activities of daily living and required no walking aids. All participants underwent a cardiological examination before their inclusion in the study. People with a diagnosed moderate to severe cardiovascular problem or cardiorespiratory symptoms at moderate to high exertion levels (i.e., poorly controlled hypertension or orthostatic hypotension) were excluded from the study. Other exclusion criteria were severe cognitive impairment, diagnosis of stroke or other severe neurological disorder, and peripheral neuropathy of the lower limbs. Participants were randomly assigned to either the intervention group, who attended supervised Greek dance classes for 10 weeks (dance group [DG]; n = 14; 13 women, 1 man; age 69.23 ± 4.35 years; mass 68.45 ± 7.35 kg, height 167.23 ± 5.23 cm), or the control group (CG; n = 12; 7 women, 5 men; age 72.57 ± 5.25 years; mass 70.22 ± 9.92 kg; height 169.23 ± 8.45 cm), who participated only in pre- and postintervention testing. At the initial laboratory session each participant was informed of the purpose of the study and gave written informed consent. All experiments were performed with the approval of the local ethics committee on human research in accordance with the Declaration of Helsinki.

Intervention Protocol

Participants of the DG attended 20 supervised sessions of traditional Greek dance over 10 consecutive weeks (two sessions per week). Each session lasted 60 min and was divided into three phases: warm-up (5 min of stretching), dance (50 min of dance practice), and recovery (5 min of stretching). For the first 2 weeks, the dance phase lasted 30–35 min to allow time for gradual conditioning. The dance phase consisted of basic, low-impact steps, which participants performed as a single group while holding hands. Dances, accompanied by traditional Greek music, were practiced in a progressive order from the simplest and least physically demanding to the most complex and dynamic (in terms of movement elements). All dances practiced throughout the intervention were of low to moderate intensity (50–60% of maximum heart rate) to avoid fatigue effects. When a participant felt discomfort during practice, he or she was allowed to discontinue participation in that particular session. There was a minimum of 1 day of rest between the dance-practice sessions. All participants in the DG completed the intervention.
Experimental Apparatus and Testing

A dual force platform (one for each foot) consisting of two adjacent 3D force plates (Balance Plate 6501, Bertec Corp., Columbus, USA) was used to measure static and dynamic balance. Angular trunk kinematics was also recorded using a multiple six-degrees-of-freedom magnetic tracking system (Flock of Birds; Ascension Inc., Burlington, VT, USA). The system consists of a control unit, a centrally located transmitter (mounted on a tripod 1 m behind the participant), and small receivers (birds) that move in the magnetic field. For the purpose of the current experiment, only one receiver was mounted to the participant’s seventh cervical vertebra (C7) using flexible Velcro bands. The receiver measured three directions of translation ($x$, $y$, and $z$) with an accuracy of 1 mm and three directions of rotation (pitch, roll, and yaw) with an accuracy of 0.1° at a sampling rate of 100 Hz (Flocks of Birds, 2002).

Static balance was evaluated using two tests: the Sharpened (tandem) Romberg (SR, 15 s) and one-legged (OL, 10 s) stance. During performance of the SR stance the participant stepped on the platform and was asked to position the heel of the nondominant limb in front of the toe of the dominant limb leaving no space between the feet, distributing body weight equally between the two limbs. For OL stance, the participant was instructed to stand on his or her dominant limb, while flexing the nonsupport limb at the knee with the plantar surface of the foot stabilized at any level along the medial surface of the shank of the supporting leg. The dominant limb was determined by self-response to the question, Which is the limb you would use for single-limb standing? The arms were stabilized on the hips with the elbows flexed at approximately 100°. Participants were instructed to look straight ahead, fixating their gaze on a marker (3-cm diameter) positioned at eye level at a distance of approximately 1.5 m. Ample time was provided for familiarization with the required posture. After stabilization in the required posture, data recording began. If balance was lost during performance of the test, the trial was repeated.

Dynamic balance was assessed by asking participants to perform a dynamic weight-shifting (WS) task in the sagittal and frontal planes (20 s). Once participants stepped on the platform, they were asked to voluntarily shift their body weight back and forth for the anteroposterior (A/P) WS task or side to side for the mediolateral (M/L) WS task. The task was repeatedly performed over a period of 20 s. Performers were instructed to stabilize their arms on the hips with the elbows flexed at 100° and try to shift their body weight “as far as possible” in both directions at a comfortable, self-selected speed without losing their balance. No other joint-movement restrictions were imposed.

Five trials were performed in each test (2 min rest between trials). Before and after training the balance tasks were performed at the same time of the day to avoid any chronobiological effects, and the presentation order was counterbalanced to control for possible order effects.

Data Recording and Analysis

Force-platform and magnetic-tracker signals were synchronously sampled through a data-acquisition board (NI PCI-6221 A/D card, National Instruments, Austin, TX, USA, sampling rate 100 Hz) using custom-built algorithms implemented
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with LABView (National Instruments). Individual force and angular kinematic data streams were analyzed using custom interactive analysis software programmed in MathCad (Mathsoft Engineering & Education, Inc., USA). Center-of-pressure (COP) signals were low-pass filtered with a fourth-order, dual-pass, zero-lag Butterworth filter (cutoff 10 Hz). Angular motion data from the C7 tracker were converted from Euler to absolute segment angles (in degrees) and digitally filtered with a low-pass Butterworth filter (dual pass, zero phase lag, fourth-order, cutoff 5.5 Hz). Selection of the cutoff frequency was based on a visual inspection of the frequency spectrum of the signal.

Changes in static balance as a result of dance practice were quantified using the following measures: (a) peak-to-peak amplitude (COP\textsubscript{max}) and standard deviation (COP\textsubscript{SD}) of mean COP displacement in the A/P (x) and M/L (y) directions and (b) peak-to-peak amplitude (TR\textsubscript{max}) and standard deviation (TR\textsubscript{SD}) of the trunk angular displacement in the pitch (x, A/P direction) and roll (y, M/L direction) planes.

Changes in dynamic balance were quantified by analyzing the C7 angular displacement and COP trajectories recorded during performance of each 20-s WS trial (Figure 1). A peak picking routine (Hatzitaki & Konstadakos, 2007) was developed to determine the number of WS cycles and the peak-to-peak C7 angular-displacement amplitude of each WS cycle. The peak-to-peak angular-displacement amplitudes detected during the WS cycles performed in a single trial were then averaged to determine the mean cycle amplitude of trunk rotation (TR\textsubscript{M}). Mean cycle amplitude of C7 angular displacement was also determined separately for the trunk flexion (forward) and extension (backward) directions during performance of A/P WS. In addition, the SD of the peak-to-peak angular-displacement amplitudes detected in one WS trial (TR\textsubscript{SD}) was calculated as a measure of within-trial variability. From the COP-displacement signal, the maximum peak-to-peak amplitude of COP displacement (COP\textsubscript{max}) in the respective WS direction (A/P [x] for sagittal- and M/L [y] for frontal-plane WS) was also determined.

A 2 (group) \times 2 (test time) analysis of variance (ANOVA) with repeated measures on test time and adjustment for significant differences between the groups on baseline measures was employed to examine differences between the groups and pre- and posttraining sessions. Significant group-by-test interactions were further broken down by comparing pre–post training differences separately for each group using post hoc Tukey’s pairwise comparisons.

Results

Static Balance

The DG and CG were equal in age, mass, and height; this was confirmed by the nonsignificant differences in measured anthropometric parameters between the two groups. There were no significant differences between the two groups in pre-intervention outcome variables of either static balance test. Analysis failed to reveal a significant effect of dance practice on postural-sway measures during performance of the SR test. This was confirmed by the absence of significant changes in COP and trunk angular-displacement measures in either of the groups (Table 1).
Figure 1 — Upper trunk angular displacement in the anteroposterior (A/P) plane during performance of one weight-shifting trial in the sagittal plane before (solid line) and after (dotted line) dance practice. The raw traces of a representative participant of the dance group are shown.
Dance training, on the other hand, induced significant postural sway and trunk-kinematic changes in the performance of the OL test (Table 2). A significant Group × Test interaction for \( \text{COP}_{\text{max}} \) and \( \text{COP}_{\text{SD}} \) in the M/L direction, \( \text{COP}_{\text{max}} F(1, 24) = 5.21, p < .05 \), \( \text{COP}_{\text{SD}} F(1, 24) = 5.72, p < .05 \), suggests that adaptations were specific to the DG. Particularly, post hoc analysis confirmed that after practice, the DG significantly reduced \( \text{COP}_{\text{max}} \) from 8.592 to 5.087 cm (\( p < .05 \)) and \( \text{COP}_{\text{SD}} \) from 1.73 to 1.33 cm (\( p < .05 \)) in the M/L direction. No significant changes were noted for the CG. \( \text{COP}_{\text{max}} \) and \( \text{COP}_{\text{SD}} \) were also reduced in the A/P direction, but these reductions only approached significance, \( \text{COP}_{\text{max}} F(1, 24) = 4.48, p = .045 \), \( \text{COP}_{\text{SD}} F(1, 24) = 3.013, p = .095 \). Post hoc analysis did not statistically verify the amplitude of these changes.

A significant Group × Test interaction for trunk angular displacement in the roll plane, \( \text{TR}_{\text{max}} \) \( F(1, 24) = 6.21, p < .05 \), \( \text{TR}_{\text{SD}} F(1, 24) = 4.62, p < .05 \), confirmed the effect of dance practice on both peak-to-peak amplitude and SD of trunk rotation during performance of the OL stance. Post hoc pre–post training comparisons showed that the DG significantly (\( p < .05 \)) decreased peak-to-peak amplitude of trunk-roll rotation from 9.032° to 4.598° and SD of trunk rotation from 2.093° to 1.131° (\( p < .05 \)) as a result of dance practice. A similar tendency toward decreased trunk rotation was noted in the pitch direction, but this reduction was not confirmed by a significant Group × Test interaction for either peak-to-peak amplitude or SD of pitch trunk rotation (Table 2).

**Dynamic Balance**

Group means and SDs of all outcome variables depicted during performance of the sagittal-plane WS task are summarized in Table 3. Before the training, there were no significant between-group differences in any of the performance variables. Posttraining WS performance was characterized by a reduction of the maximum peak-to-peak amplitude of COP displacement in the A/P direction relative to
pretraining values for both groups (Table 3). Although this reduction was reflected in a highly significant main effect for test, \( \text{COP}_{\text{max}}(x) F(1, 24) = 100.19, p < .001 \), there was no significant Group × Test interaction, \( \text{COP}_{\text{max}}(x) F(1, 24) = 3.68, p > .05 \).

Dance-specific adaptations in upper trunk rotation during sagittal-plane WS are clearly depicted in Figure 1 for a representative DG participant before and after practice. These effects were statistically confirmed by significant Group ×
Test interactions for the mean cycle amplitude and within-trial cycle variance of trunk rotation, $TR_M F(1, 24) = 17.25, p < .001$, $TR_{SD} F(1, 24) = 3.88, p < .05$. Post hoc analysis confirmed that as a result of dance practice the DG significantly increased $TR_M$ from $48.3^\circ$ to $69.7^\circ$ ($p < .001$) while decreasing $TR_{SD}$ ($p < .05$). No significant pre- to postpractice changes were noted for the CG. Furthermore, when the mean cycle amplitude of maximum trunk inclination was separated into its forward and backward components, we noted that the increase in $TR_M$ was a result of an increase in maximum backward trunk extension (Figure 2). This effect was verified by a highly significant Group × Test interaction for the mean cycle amplitude of backward trunk extension, $TR_{backward} F(1, 24) = 20.68, p < .001$. Pairwise pre- to postpractice comparisons confirmed that the DG increased $TR_{backward}$ from $10.85^\circ$ to $36.6^\circ$ ($p < .05$), whereas a nonsignificant increase was noted for the CG.

By contrast, the mean range of forward trunk inclination significantly decreased

![Figure 2](image-url) — Mean cycle amplitude of trunk rotation ($TR_{mean}$) and mean amplitude of forward ($TR_{forward}$) and backward ($TR_{backward}$) trunk inclination during sagittal-plane weight-shifting performance before and after practice for the dance and control groups. Note the increase in backward trunk inclination of the dance group as a result of dance practice. Error bars indicate 95% confidence interval. *$p < .05$ from pre to post. **$p < .001$ from pre to post.
for both groups, $TR_{\text{forward}} F(1, 24) = 7.83, p < .05$, possibly as a result of learning. Finally, both groups significantly increased the number of WS cycles performed during one 20-s WS trial, $n$ cycles $F(1, 24) = 79.76, p < .001$.

Analysis also revealed significant training-induced changes in frontal-plane WS performance (Table 4). These were confirmed by a significant Group $\times$ Test interaction for the mean cycle amplitude of trunk-roll rotation, $TR_M F(1, 24) = 4.65, p < .05$, and the number of WS cycles, $F(1, 24) = 8.9, p < .001$. Post hoc analysis confirmed that as a result of dance training, the DG significantly increased $TR_M$ in the roll plane ($p < .05$) from $52.961^\circ$ to $63.890^\circ$ and the number of WS cycles performed in each trial from approximately 6 to 10 cycles ($p < .001$). On the other hand, COP$_{\text{max}}$ in the main WS (M/L) direction was not affected by training, and neither was the within-trial WS-cycle variability.

**Discussion**

In this study, we examined the efficacy of a 10-week Greek traditional dance program in improving static and dynamic balance control of community-dwelling healthy elderly adults. Dance practice was effective in reducing postural sway during performance of OL stance and increasing the range of upper trunk rotation during dynamic WS in the sagittal and frontal planes. To our knowledge, this is the first study to show the positive influence of traditional Greek dance practice on indices of static and dynamic balance control in a group of healthy elderly adults.

**Static Balance**

As a result of practicing traditional Greek dance, DG participants significantly reduced the amplitude of their COP displacement and upper trunk sway during single-limb standing. These results complement previous studies that have reported improvements of single-leg-standing balance in elderly women partici-

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<th>Prepractice</th>
<th>Postpractice</th>
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<td></td>
<td>Dance group</td>
<td>Control group</td>
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<tr>
<td>COP$_{\text{max}}$ (y; cm)</td>
<td>14.370 ± 4.591</td>
<td>19.022 ± 5.818</td>
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<tr>
<td>TR$_M$ (°)</td>
<td>52.961 ± 13.364</td>
<td>52.267 ± 12.811</td>
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<tr>
<td>TR$_{SD}$ (°)</td>
<td>3.660 ± 1.472</td>
<td>3.423 ± 1.523</td>
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<td>n cycles</td>
<td>6.059 ± 1.08</td>
<td>5.750 ± 1.28</td>
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*Significantly different than prepractice value at $p < .05$. **Significantly different than prepractice value at $p < .001$. 

Table 4  Peak-to-Peak Amplitude of COP Displacement (COP$_{\text{max}}$) in the Mediolateral (y) Direction, Mean Cycle Amplitude (TR$_{\text{mean}}$) and Standard Deviation (TR$_{SD}$) of Trunk Rotation, and Number of Weight-Shifting Cycles in the Frontal Plane, $M \pm SD$
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pating in a 12-week dance-based aerobic-exercise program (Shigematsu et al., 2002), as well as in older adults with long experience (>10 years) in Tai Chi (Hong et al., 2000). The sway reduction noted during single-limb standing could be partly attributed to the improved strength of the ankle muscles induced by dance practice. Most traditional Greek dances involve steps that require long periods of single-limb standing. Therefore, it does not seem unreasonable to suggest that dance practice could impose greater activation requirements in the ankle muscles known to play a primary role in static postural control (Amiridis, Hatzitaki, & Arabatzi, 2003). This speculation is further supported by previous studies showing that selectively improving the strength of the ankle dorsiflexors has been effective in reducing postural sway in the elderly (Amiridis, Arabatzi, Violaris, Stavropoulos, & Hatzitaki, 2005). This improvement was a result of increased reliance on the ankle mechanism to maintain balance, while at the same time elderly adults avoided using the more “fall-prone” hip strategy. Based on this evidence, it is possible that practicing traditional Greek dances also increases the contribution of the ankle mechanism in static postural control, possibly by enhancing active control of ankle stiffness (Winter, Patla, Prince, Ishac, & Gielo-Perczak, 1998).

Although traditional Greek dance substantially improved single-limb standing, it did not have a significant effect on postural-sway measures during performance of the SR stance. One possible explanation for this effect is that the dance-induced adaptations were task specific. Previous studies have reported improvements in balance tasks that are specific to the training (Sihvonen et al., 2004). Another possible explanation could be related to task difficulty. Single-limb standing imposes greater postural demands than heel-to-toe (SR) standing. Task difficulty should therefore be taken into consideration when selecting the appropriate balance tasks to test the efficacy of exercise interventions. Clinical measures of balance or simple static balance tests might not be sensitive enough to sufficiently challenge the balance-control system to detect exercise-specific postural adaptations.

Dynamic Balance

Dance practice significantly increased the range of active upper trunk rotation during performance of the voluntary dynamic WS task in the sagittal and frontal planes. More interesting, however, is that the increased range of trunk rotation in the A/P direction was the result of substantially increasing backward trunk inclination while reducing forward trunk bending (Figure 2). A reduced range of trunk rotation before training could be attributed to age-related increases in active trunk postural stiffness (Allum, Carpenter, Honegger, Adkin, & Bloem, 2002), which seriously decreases hip-joint mobility (Roach & Miles, 1991) and subsequently the limits of stability. Traditional Greek dance involves activities (i.e., head and body rotations, weight shifts, and changes in the base of support from double- to single-leg standing) that constantly challenge the postural-control system to maintain equilibrium while the center of gravity is being voluntarily shifted to the limits of stability. It could therefore be inferred that dance practice improved trunk flexibility and hip-joint mobility and reduced stiffness of the muscles responsible for controlling the trunk’s sway during dynamic WS. Moreover, a substantial
increase in backward trunk inclination as a result of dance practice does not seem surprising, because many Greek dances require performers to bend their trunk backward and maintain this backward trunk inclination for several seconds. It might also be possible to attribute the increase in the range of backward trunk inclination to a dance-induced suppression of the psychological constraints associated with age-related anxiety and fear of falling, which are known to reduce the limits of stability, particularly in the backward direction (Hageman, Leibowitz, & Blanke, 1995). Finally, one cannot preclude the possibility of attributing the observed dance-induced adaptations to short-term motor-skill learning effects, which have also been reported after Tai Chi practice (Tsang & Hui-Chan, 2004).

The findings of the current study complement previous reports stressing the benefits of Tai Chi training on dynamic balance in an older population (Tsang & Hui-Chan, 2003). Particularly, it was shown that experienced elderly Tai Chi practitioners who initiated voluntary weight shifting to different spatial locations within their base of support more quickly leaned farther without losing their stability and had smoother control of their leaning trajectory than their age-matched controls. The same performance benefits were also noted in healthy elderly adults participating in only 4 weeks of intensive Tai Chi training (Tsang & Hui-Chan, 2004). In addition, both dance-based aerobic and computerized balance training seem to be effective in increasing the stability range during performance of the functional-reach (Shigematsu et al., 2002) and limits-of-stability tests (Rose & Clark, 2000) in frail older adults.

The increase in the amplitude of trunk rotation was accompanied by a significant reduction of the A/P COP-dispersion amplitude during sagittal-plane WS. This reduction could be imposed by the need to increase the stability of the postural base, possibly through increases in active ankle stiffness (Hatzitaki, Amiridis, & Arabatzis, 2005), to compensate for the destabilization induced by the greater range of trunk rotation as a result of practice. Unexpectedly, this reduction was significant for both the DG and the CG, a finding that could be attributed to task familiarization. It is possible that the five trials of the WS task were sufficient for adapting a more efficient and less balance-threatening way to perform this task. This is further supported by the finding that the CG also decreased the amplitude of forward trunk inclination during sagittal-plane WS and increased the number of WS cycles.

In summary, the current study has shown that traditional Greek dance practice could be a very effective means of physical activity for improving particular aspects of static and dynamic balance control in the elderly. Considering the additional benefits of dance (a pleasant form of low-impact exercise, social interaction, and high attendance in the elderly), it should be considered as a potential cost-effective physical activity program for improving balance and potentially preventing falls that can easily be implemented communitywide.

Generalization of the current findings, however, must be undertaken with caution because of the relatively small sample size and lack of retention tests. In addition, it is not certain to what extent the dance-induced balance improvements noted in the current study would contribute to fall prevention and a reduction in the incidence of falls. Follow-up studies should address the effect of dance training using more realistic balance-testing protocols related to daily life activities.
such as gait and obstacle-avoidance skills, as well as the impact of training on psychomotor indices of balance confidence, fear of falling, and fall incidence.

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References


