Dancing in the golden age: a study on physical function, quality of life, and social engagement

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Abstract

The aim of this study was to determine the effects of dancing activity based on different dance styles, in groups as well as with a partner, on mobility performance, quality of life and social engagement in a sample of older adults. One hundred and sixty-three older adults (mean age, 70 years; SD = 4 years) participated in a supervised dancing activity programme for 16 weeks. The dancing activity included different dance routines and was progressive in terms of motor complexity. Data on mobility, health-related quality of life and social engagement were collected before and after a 16-week training period. Significant improvements in mobility, quality of life and social engagement were noted in single as well as dual-task performance after the intervention. Our results emphasise the benefit of a 16-week dance training on multidimensional features, including physical and psychosocial domains, which are important for successful ageing.

Keywords*:* dance; physical activity; exercise; mobility; dual-task.

The ageing process is a complex phenomenon that may be accompanied by physical and psychosocial changes.[1-5] Age-related changes may compromise independence and quality of life and consequently increase functional decline, loss of independence, disability and frailty.[3, 6] In particular, decline in mobility, defined as the ability to move in an environment independently and safely,[7] may negatively affect the ability to carry out activities of daily living and reduce quality of life and social interaction.[2, 8] Indeed, social isolation, including contact with friends and family, low mood and living alone[9, 10] are important risks for the health of older people[11] and are associated with a perceived difficulty to perform basic fundamental activities of daily living.[10] Thus, for older people, maintaining independence in mobility and reducing the need for health and social care are very important goals for physical and psychosocial well-being.

Physical and psychosocial functions can be maintained and improved during old age via participation in regular physical exercise. Regular physical exercise is one of the most important components for successful ageing,[12] including the preservation of both physical and cognitive function, maintenance of social interaction and continued engagement in meaningful activities.

Previous studies suggested that physical training programmes,[1, 13-16] including progressive aerobic, resistance, balance or functional training, can improve mobility and general quality of life in older people. Furthermore, physical exercise intervention may be beneficial for psychosocial domains, including social interaction,[17] due to the social engagement of physical training programmes (e.g. group activity). However, sustaining regular exercise behaviour may be difficult for older adults, especially when sport and exercise activities were not performed during youth or adulthood.[18, 19]

Dancing is a multidimensional activity[20] integrating physical, cognitive, emotional and social elements,[21] and may be a promising alternative to traditional exercise programmes.

Furthermore, dance may be adapted to the physical limits of the older people[22] and provides a safe and fun way to improve physical and psychosocial domains.

Many studies have examined the effects of different types of dance programmes in improving a range of physical functions.[23, 24] Moreover, research into the benefits of dance reported an improvement in mobility,[25, 26] static and dynamic balance performance,[18, 27, 28] muscular strength[20] and architecture[29] and aerobic endurance.[25, 30, 31] For instance, Salsa[19] and Latin (e.g. Merengue or Bachata) dances[32] improve balance capability and, therefore, are a useful method for reducing the risk of falling,[19, 26, 30, 33] fear of falling[26] and perceived mobility limitations.[31] Training using a low impact aerobic dance resulted in an observed improvement in cardiopulmonary function.[25, 30] Consequently, dance is considered an important aspect to reduce risk of mortality due to cardiovascular disease.[21]

Dance may be considered a complex sensorimotor activity that requires the integration of spatial pattern, rhythm, synchronization to external stimuli, learning processes, memory, attention and whole-body coordination.[34] It is a form of complex motor activity that requires a higher cognitive control (e.g. continuous feedback of body position),[31, 35] as well as moving to a rhythm with or without a partner and, therefore, depicts a motor-cognitive dual task activity. Thus, due to the complex required elements, dance is effective in improving cognitive function.[36-38]

Additionally, dance may have a positive effect on some psychosocial outcomes, such as depression,[18, 39] life satisfaction,[40] emotional and bodily pain and quality of life.[25]
For example, Britten at al.[26] used an 8-week contemporary dance intervention and found a positive improvement on incidence of depression in older females.

Furthermore, dance was found to improve well-being and reduce stress, anxiety, psychological distress and fatigue.[25, 41] Dancing constitutes a form of expression[33] and promotes social interaction,[24, 42] which, on its own, is recognized to have beneficial effects on

cognition.[43] Interestingly, older adults reported to be particularly attracted to dancing because a playful and spontaneous atmosphere enabled them to remember and 're-live' happy experiences from their youth.[26, 42]

In summary, dance training is a form of physical exercise that increases physical function as well as social interaction and motivation.[19] However, to our knowledge only one study[32] has previously investigated the effects of dancing, based on a Caribbean style, in older Italian adults. Specifically, Federici et al.[32] found a positive improvement on balance performance in a sample aged 58 to 68 years. Moreover, despite previous studies about the effect of one specific dancing style on physical and psychosocial outcomes, we decided to focus our study on different types of dance styles, in groups as well as with a partner. This study may provide further knowledge for improving a successful ageing through the increase of evidences about dance intervention response, feasibility, as well as participation risk assessment. Therefore, we investigated the effects of dance training, based on different dance styles, in groups as well as with a partner, on physical and psychosocial functions in a sample of older Italian adults (aged 65–79 years). The primary aim of our study was to examine the effects of dancing activity on mobility performance, both in single and dual-task activities. The secondary aim was to assess the effects of dancing activity on quality of life and social engagement. This intervention was designed to improve mobility performance as well as psychosocial function through different dance styles in a group as well as with a partner in a socially engaging environment.

Design and Methods

Study Design

This pre-test–post-test study focused on the effects of dance training on physical and psychosocial functions in a sample of older adults. The sample participated in a dancing

activity for a period of 16 weeks. All participants were assessed before and after the training period. The study was conducted from January 2016 to May 2016.

Participants

The participants were recruited from 7 senior social centres in North-West Italy (specifically Piedmont region). Participants did not receive any incentive to take part. Originally, 350 potential subjects were invited to participate in the study. An initial assessment was carried out, based on socio-demographic data to determine eligibility. The inclusion criteria were age 65 years or older, retired, living independently, having a medical certificate of good health and able to walk without assistance. Participants were excluded if they presented certain medical conditions, such as an acute disease (e.g. myocardial infarction), chronic disease (e.g. Parkinson's disease, Alzheimer's disease) or a major motor deficit (e.g. orthopaedic impairment).

Seventy-two participants declined to participate in the study. One hundred and fifteen were excluded because they did not meet the inclusion criteria. Specifically, 44 participants did not meet the age cut-off, 19 were still working, 24 used a walking aid, 15 did not provide a medical certificate of good health and 13 reported neurological/musculoskeletal diseases.

Participants were informed that in their participation the study was voluntary and confidential. Participants gave their informed written consent to participate in the study in compliance with the ethical standards provided in the 1964 Declaration of Helsinki. The study was approved by the Ethical Committee of the University of Torino (Protocol Number: 60343).

The descriptive characteristics of the participants are presented in Table 1. A total of 163 older persons with an average age of 70 years [standard deviation (SD) = 4 years] participated in the study, including 123 women (75.5%; mean age, 70 years; SD = 4 years) and 40 men (24.5%; mean age, 71 years; SD = 3 years).

[Insert Table 1 here]

Intervention

The dance activity was composed of two 60-min sessions per week for 16 consecutive weeks for a total of 32 classes. All the dance classes followed the same training protocol. Graduates in Physical Activity and Sport Sciences, specialised in physical activity training for older adults, and qualified dancing instructors supervised and conducted the training. The instructors monitored adherence to the overall programme.

Each dance session lasted 60 min and comprised three phases: a warm-up (10 min), a main phase (40 min) and a cool-down (10 min). The exercise session began with a 10-min warm up that included mobilising exercises (e.g. neck and trunk rotation, lateral and forward flexion and a walking activity at a slow pace/rhythm of low intensity in combination with upper limb exercises). The main phase was progressive in terms of motor complexity and included different dance routines, such as Slow Waltz, Tango and Foxtrot, Traditional Waltz, Polka and Mazurka styles, and choreography routines such as Bachata and Country. The movements were simple and easy to learn and focused on individual movement skills requiring the use of both upper and lower limbs.[25] Dance movements were performed either in pairs or individually, focusing on shifting the centre of gravity forward, backward and sideways. The rhythm of the movement changed in intensity according to the music.

The exercise session ended with a 10-min cool-down that included breathing exercises. During the dance sessions, each participant could choose which rhythm to follow in order to regulate the intensity of the training. The same dance protocol was followed in each class.

Procedure

The demographic and social data, age, gender, previous employment and level of education were self-reported. Investigators obtained and recorded baseline assessments of mobility,

health-related quality of life and social engagement. Similar assessments were performed at the completion of the 16-week training period. All tests were conducted by the same investigator and were performed in one day.

The Timed Up and Go Test (TUG) involves standing up from a chair, walking 3 m, turning 180°, walking back and sitting back down in the chair.[44] Participants were instructed to stand up from a chair, walk to a cone, walk around the cone, walk back to the chair and sit down at a comfortable speed. The test ended when the participant's buttocks first touched the surface of the seat. The time was recorded in seconds. The intra-rater reliability was 0.95.[45]

The performance of TUG in dual-task condition (TUGM) consists of performing the TUG and simultaneously carrying a glass of water without spilling it, using the preferred hand [46]. The intra-rater reliability was 0.99.[47]

The Four Square Step (FSS) test involves rapidly changing direction while the participant is stepping forward, backward and sideways in a predetermined sequence over four walking sticks placed in a cross configuration on the ground.[48] The test ended when the participant finished the predetermined sequence. The time was recorded in seconds. The test-rest reliability was 0.98.[48]

The SF-12 is a self-report questionnaire derived from the SF-36 Health Survey and investigates health-related quality of life.[49] The questionnaire is composed of 12 questions and eight physical and mental health summary measures (e.g. physical functioning, role limitations due to physical functioning, bodily pain, general health perceptions, vitality, social functioning, role limitations due to emotional problems and mental health). According to Ware et al.,[49] two summary scores, the physical (SF-12 PC) and the mental health (SF-12 MC) components, were computed. Higher scores in both SF-12 PC and MC indicated a high health-related quality of life.

The 6-item Lubben Social Network Scale (LSNS-6[50]) is a shortened version of the 12-item Lubben Social Network Scale[51] and assesses social engagement including with family and friends. This self-report questionnaire contains six items that are scored on a 5-point scale (from 0 to 5 points), with a total score ranging from 0 to 30. Higher scores indicate high social support.

Statistical Analyses

Means and standard deviations were calculated for all data. The distribution of continuous outcome variables was checked to ensure they were approximately normally distributed. The assumption of normality for the outcome variables was confirmed ($p > 0.05$). Controlling for gender a repeated measures with multiple dependent measures (MANOVA) within-factor Time (pre-test and post-test) and Test (TUG, TUGM, FSS, SF-12 MC, SF-12 PC, LSNS-6) was performed to investigate changes between the baseline and end of training. Differences between pre-test and post-test were determined by significant Time × Task interactions. Post hoc analysis was performed using Bonferroni adjustment. The effect size was determined using partial η^2. A value of 0.10 indicates a small effect, 0.25 indicates a medium effect and 0.40 indicates a large effect.[52] Mean adherence to the dance programme was calculated by noting each session that was attended and then dividing this by 32, the total number of sessions the study covered. SPSS 24.0 for Windows was used for all statistical analyses. The statistical significance level was set at $p < 0.05$.

Results

Table 2 displays the mean scores and standard deviations for the intervention groups in the TUG, TUGM and FSS before and after the intervention.

[Insert Table 2 here]

Statistically significant simple main effect of Time [$F(1,161) = 45.497$, $p < 0.0001$, Wilks' $\Lambda = 0.780$, partial $\eta^2 = 0.220$] and Test [$F(5,157) = 2016.359$, $p < 0.0001$, Wilks' $\Lambda =$

0.024, partial $\eta^2 = 0.985$] were observed. Moreover, statistically significant Time × Test interactions were observed [$F(5,157) = 102.552$, $p < 0.0001$, Wilks' $\Lambda = 0.234$, partial $\eta^2 = 0.020$].

Specifically, post hoc analysis with Bonferroni adjustment showed an overall statistically significantly lower score between pre-test and post-test in TUG [mean difference = 1.52 (95% CI, 0.45–2.60) s; $p < 0.001$], TUGM [mean difference = 1.21 (95% CI, 0.82–1.60) s; $p < 0.05$] and FSS [mean difference = 1.16 (95% CI, 0.08–2.24) s; $p < 0.001$]. Conversely, the post hoc analysis with Bonferroni adjustment showed an overall statistically significantly higher score between pre-test and post-test in SF-12 PC [mean difference = -3.33 (95% CI, -4.41 to -2.25) points; $p < 0.001$] SF-12 MC [mean difference = -3.09 (95% CI, -4.7 to -2.01) points; $p < 0.05$] and LSNS-6 [mean difference = -1.56 (95% CI, -2.64 to -0.49) points; $p < 0.001$]. For more details see Table 2.

Considering the adherence of the study, all participants attended at least 85% of the total dancing sessions.

Discussion

The focus of the study was to determine the effects of dancing activity on physical and psychosocial functions in a sample of older Italian adults. In particular, the study aimed to determine the effects of dance training, based on different dance styles in a group as well as with a partner, on mobility function, quality of life and social engagement. The main finding of our study was the efficacy of the intervention on the outcome variables and the acceptable adherence to the dancing sessions. In particular, our results showed that participants obtained significant improvements in mobility, quality of life and social engagement after the 16-week dance training.

In particular, regarding the first aim of the study, we found a significant improvement both in single and in dual-task mobility performance. Specifically, we found a reduction of

9.84%, 9.12% and 8.14% in performance time of TUG, FSS and TUGM, respectively. Previous studies have reported the positive effects of dance activity to maintain/improve physical function and, in particular, mobility performance.[24, 33] Dancing involves shifting the centre of gravity forwards, backwards and sideways, contributing to the maintenance of balance.[32] Static and dynamic mobility performances were improved after intervention comprising dance based on exercise programmes [19, 25, 30] as well as dance based on Turkish[18] and Greek traditions.[53] In line with this, our results support the positive effect of dance on mobility function. Moreover, our findings showed an improvement in dual-task abilities, common tasks required during everyday life.[54, 55] Similarly, Hamacher et al.[35] showed that dance activity significantly increases multitasking abilities compared with health-related exercise, highlighting the benefit of multi-tasking exercises [16] such as dance activity to improve motor-cognitive dual-task performance. Indeed, dance may be considered a rhythmic activity that requires multiple physical and cognitive elements.[37] It involves memorizing and changing several dance routines, as well as concentrating on moves to musical beats, and involves cognitive resources such as executive function and memory.[31, 35]

Focusing on the secondary aim of our study, we observed an improvement in quality of life and social engagement between the beginning and the end of the intervention. The results showed an improvement in both physical and in mental components (6.58% and 5.75%, respectively). Using low-impact aerobic dancing activity, Hui et al.[25] found a significant improvement in general health. Similar results were reported using a Turkish folkloric dance with improvements in health related to quality of life, in particular physical function, general health and mental health subscales.[18] Furthermore, we observed an increase of 9.14% in social engagement between the baseline and the end of the intervention indicating the potential benefit of dance on social skills. Our data support the idea that dance may enhance and extend social life[25] because of its positive effects on motivation and social

interaction.[33] We may speculate that dance, via social contact with other peers, may encourage fun and enjoyment and maintain/improve connections with others everyday life, an important aspect for increasing general psychosocial well-being.[24]

Finally, the adherence observed in our study was similar to previous studies into dance activity. For example, Britten et al.[26] reported an attrition rate of 15%, with an overall mean adherence rate of 84.3% over 20 sessions during an 8-week contemporary dance intervention. Bennet et al.[26] reported an attendance of 80% using an 8-week line dancing training. Similar to our study, Meron et al.[37, 38] showed an adherence of about 80% using ballroom dancing. Additionally, no attrition, complication and adverse events occurred during the training, in line with other studies.[32, 37] Indeed, all the participants engaged in the training completed the study. Taken together these findings suggest that this training, based on different dance styles, is safe and sustainable showing as it can be a promising alternative to traditional exercise programmes for older adults, in accordance with other studies.[32, 38, 41]

Our study has some limitations. First, this study utilized a one-group design that did not allow a comparison between the intervention and control groups, therefore, limiting the generalization of the findings. Moreover, the present study comprised a higher ratio of females than males; therefore, the findings are more applicable to older women that have a greater risk of functional decline.[56] However, this ratio is in line with the Italian female-to-male trend.[57] In addition, we only used the TUG test in both single and dual tasks, the FSS, SF-12 scale and LSNS-6 to measure mobility, quality of life and social network, and no other additional outcomes or confounder variables were used to better understand the effect of the intervention.

Conclusion

In conclusion our results emphasise the benefit of a 16-week dance training in a sample of older Italian adults on physical and psychosocial domains, accompanied with a high

adherence rate. In particular, we demonstrated the positive effects of dance training, in a group as well as with a partner, on mobility performance during single and dual-task performance, and the improvement of quality of life and social engagement in older people. These are among the principal goals for independent life in older adults. Multidimensional aspects, including physical and psychosocial domains, are important factors for successful ageing. Moreover, our results showed that a dance training based on different dance styles may be sustainable and acceptable by independent older adults. Therefore, we believe that dance is a feasible form of physical training as it may be performed in different contexts, does not require expensive equipment and is very suitable and adaptable to the physical limitations of older adults.

Conflict of interest

The authors declare no conflicts of interest.

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Table 1

Socio-demographic characteristics and results of test performance

Variable	Category	*N*	%
Gender	Women	123	75.5
	Men	40	24.5
Previous Job	Non–manual labour	62	38.0
	Manual labour	101	62.0
Level of education	Low	149	91.4
	High	14	8.6
Family condition	Never married	70	42.9
	Married	70	42.9
	Widow/Widower	18	11.0
	Divorced	5	3.2

Notes: %, Percentage; Level of Educational: low, corresponding to compulsory education (primary school) and high, corresponding to additional non-compulsory education.

Table 2

Repeated Measures with Multiple Dependent Measures (MANOVA)

	Baseline		Post-Test		*% Change*		Time	Test	Time × Test
	M	SD	M	SD	M	SD			
TUG (s)	15.30	1.08	13.78	0.92	- 9.84	3.90			
TUGM (s)	16.80	1.16	15.51	1.13	- 8.41	4.22			
FSS (s)	13.97	0.97	12.81	0.82	- 9.12	4.14	F = 45.497	F = 2016.359	*F* = 102.552
SF-12 PC (points)	46.92	7.59	50.25	5.75	6.58	11.46	p < 0.0001	p < 0.0001	p < 0.0001
SF-12 MC (points)	44.98	8.59	48.07	7.27	5.75	15.72	Wilks' Λ = 0.780	Wilks' Λ = 0.015,	Wilks' Λ = 0.234
LSNS-6 (points)	16.87	4.14	18.44	3.15	9.14	13.01			

Notes: Data presented as mean (M) and standard deviation (SD). TUG, Timed Up and Go Test; TUGM, TUG while carrying a glass of water; FSS, Four Square Step Test; SF-12 PC, physical health component of the SF-12; SF-12 MC, physical mental component of the SF-12; LSNS-6, 6-item Lubben Social Network Scale; *% Change:* Relative percentage between pre- and post-intervention.