Complementary Therapies in Clinical Practice 37 (2019) 6–10

Contents lists available at ScienceDirect

Complementary Therapies in Clinical Practice

journal homepage: www.elsevier.com/locate/ctcp

Social dance for health and wellbeing in later life☆

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1. Introduction

Participating in physical activity can improve health and well-being in later life [1]. Unfortunately, physical activity levels decline significantly between the ages of 20 to 90 years [2]. In Ireland, less than a third of adults over 50 years are sufficiently active [3] and the oldest of old are predisposed to greater sedentary behaviour [4]. This pattern is replicated worldwide with sedentary time accounting for 65%–80% of an older adult's day [5]. Recent research suggests that increased public awareness does not result in improved exercise participation among the older generation [6]. Furthermore, evidence indicates that older adults prefer exercise that is fun, achievable and facilitates social connectedness [6].

Social dance in Ireland encompasses a leisurely social activity that gives people a sense of cultural and community identity [7]. It is a partnered dance involving multidirectional movements, weight shifting and single leg stepping [8]. Social dance includes a range of dance tempi and is not restricted to one genre (i.e. waltzes, hornpipes, quicksteps and marches). Research has found that older social dancers have better balance, gait, cognition and physical functioning compared to aged matched controls [9–11]. The prevalence rates for loneliness in Europe range from 10-20% and social isolation and loneliness are linked with physical and mental health problems [12]. Group interaction in dance may help to negate feelings of loneliness, alleviate social phobia and foster a sense of happiness in this population [13]. Dancing can improve coping mechanisms, self-esteem [14] and depression [15]. Despite the health benefits of social dance, research among older non-dancers in Ireland is lacking. Given that dance is a popular social activity in Ireland and older Irish people rate dance as one of their main cultural and leisure activities prior to hospitalization [16], research examining the feasibility of social dance in older Irish adults is needed. There is also a need to examine the feasibility of a home dance programme in this population. To the authors' knowledge, the benefit of a home Irish dance programme has only been explored in those with Parkinson's disease [17]. Home programmes can target physical inactivity and sedentary behaviour by increasing the volume of weekly exercise and by eliminating travel issues getting to and from dance classes. Therefore, as a pre-requisite to a larger trial, the aim of this feasibility pilot study is to:

(1) explore the feasibility of social dance classes among community-dwelling older adults in Ireland (safety, acceptability, adherence)
(2) provide preliminary information on the potential benefit of the classes on physical and emotional health.

2. Materials and methods

A single group design with assessments before and after the intervention was used. Ethical approval was attained from the University's Research Ethics Committee (2017_10_09_EHS).

2.1. Recruitment

As this was a feasibility study, sample size calculations were not appropriate [18]. A convenience sample of participants were recruited from local community-based retirement groups. All eligible participants that expressed an interest were included in the study up to a limit of sixteen. This limit was chosen in consultation with dance teachers to ensure safety and an appropriate ratio of personnel to participants. Volunteers were eligible for inclusion if they were 65 years or older, community-dwelling, able to walk at least 3 metres without a walking stick and had a basic understanding of the English language or an identified individual who could act as a translator. Those who had danced more than twice in the previous 6 months were ineligible. Volunteers were also excluded if they subjectively reported health problems that contraindicated participation in exercise. Participants

☆ This manuscript entitled "Social dance for health and wellbeing in later life" has not been published previously and is not under consideration by another journal at present and will not be submitted to another journal before a final editorial decision has been made. All authors declare that they have contributed to this paper and have approved the final manuscript.

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https://doi.org/10.1016/j.ctcp.2019.07.006
Received 24 February 2019; Received in revised form 17 July 2019; Accepted 17 July 2019
Available online 18 July 2019
1744-3881/

readiness to exercise was assessed via The Physical Activity Readiness Questionnaire (PAR-Q+) [19]. Written information about the study was given to volunteers. Signed informed consent was provided by all participants.

2.2. Assessment

The assessments were completed the week before the dance classes began and the week after the last class. The assessments were completed by two Chartered Physiotherapists. Participants age, gender, number of years in education, prior dance experience, falls history in the previous 12 months, comorbidities and medication were recorded. Participants were asked to report any changes in their usual medical or exercise regime during the study.

2.3. Outcome measures

2.3.1. Primary outcome

As this was a feasibility study, the primary outcomes were used to objectively determine the feasibility of the intervention as follows:

- Adverse effects/safety: the intervention was considered safe if no falls, excessive muscle soreness or excessive fatigue were verbally reported.
- Attendance at the dance classes: the aim of this study was to achieve an attendance rate of ≥70% [17].
- Adherence to the home programme: participation was monitored using a home programme diary.
- Acceptability of the intervention: participants level of satisfaction with the content and delivery of the dance classes was verbally sought and recorded.
- Attrition rates: attrition rate was documented along with reasons for dropping out.
- Resource requirements: availability of assessment rooms, dance studios and personnel were documented.

2.3.2. Secondary outcomes

The following valid and reliable outcome measures were used to assess function, quality of life and health utility: The Short Physical Performance Battery (SPPB) was used to assess physical function [20,21]. Dual task performance was assessed using the timed up and go test-motor (TUG-motor) and walk while talking test (WWT) [22]. The 2-min step test was used to measure lower limb endurance [23]. The trail-making test A and B was used to assess executive function. Completion of this test involves various executive functions including cognitive flexibility, visual processing and processing speed [24]. In this study the time to complete part A was used as a measure of processing speed and the time to complete part B was used to asses executive functioning. The difference in the time taking to complete part B and A (Trail B-A) was used as a measure of cognitive flexibility [25]. Generic quality of life was captured using the Control, Autonomy, Self-Realization and Pleasure (CASP-19) [26]. This measure was developed and validated for use in the older population. The EuroQol EQ visual analogue scale (EQ VAS) was used to measure health utility [10,27]. The scale is rated from 0 to 100 and is used to determine an individual's perception of their health status [28]. Questionnaires from the National Institutes of Health (NIH) toolbox emotion battery (psychological wellbeing, social relationships, perceived stress and self efficacy) were used to assess different aspects of emotional health [29]. Psychological wellbeing was assessed using two life satisfaction and one positive affect questionnaire. Social relationships were assessed through a loneliness and friendship questionnaire while negative affect was assessed using an anger, fear and sadness questionnaire. Perceived stress and self-efficacy were also assessed.

2.4. Intervention

A 1.5-hours social dance class was provided weekly for six weeks. Spouses and family members were invited as dance partners. Classes were led by an experienced dancing teacher, under the guidance of a Chartered Physiotherapist. Social dances including "*Peeler and the Goat*", "*Shoe the Donkey*", "*The Stack of Barley*", "*The Pride of Erin Waltz*" and "*The Military Two Step*" were taught. All dances were partnered and involved multidirectional stepping, weight shifting and turning. Dances were taught and progressed in line with the participants' abilities. Frequent rests were taken during the class and participants were free to take additional rests if needed. Participants were encouraged to ask questions and provide feedback. All participants were advised to report any adverse effects and the teacher monitored safety during the classes and recorded any issues. A playlist of participants' personalised music preferences was developed for the classes. This was done to enhance a sense of enjoyment and reminiscence.

The home dance programme involved integrating dance steps into the daily routine such as waltzing the length of the kitchen counter and side stepping while brushing teeth. Participants were instructed to take components of the dances taught in class and practice them while completing daily tasks (for example walking from one room to next, folding clothes, washing up, sweeping the floor). A demonstration was given to participants at the end of the first dance class. Participants were requested to use a home diary/logsheet provided by the dance teacher to record the amount of daily dancing time in minutes and to list activities into which dance was integrated. Participants were asked to complete 60 minutes (mins) of dancing at home each week. Participation in the 60 mins home dance programme along with the 90 mins dance class offered participants 150- mins of aerobic exercise per week. This weekly duration of aerobic exercise is in line with American College of Sports Medicine exercise recommendations for older adults [30].

2.5. Statistical analysis

Data was analysed using SPSS version 22. Demographic data was analysed using descriptive and frequency statistics. Non-parametric data was analysed using the Wilcoxon signed-ranks test and parametric data was analysed using the Paired samples *t*-test. A significance level of < 0.05 was set for all statistical tests. The responses for missing questionnaire items were calculated by dividing the sum of the answered questions by the number of items answered. The attendance rate at dance classes was calculated by dividing the total number of attendees at the classes by the number of participants that were recruited to attend over the six weeks.

3. Results

Fig. 1 shows the flow of participants through the study. The participants identified (n = 26) presented with cardiovascular (n = 17), respiratory (n = 3), muscloskeletal (n = 12), endocrinological (n = 1), neurological (n = 3) and ophthalmological (n = 2) comorbidities, however, there were no contraindications to exercise. All participants completed the PAR-Q+ and were deemed suitable to participate. The demographic profile of those that enrolled in the study is shown in Table 1.

Four participants dropped out of the study (Fig. 1). Of those that completed the study, 10 attended over 80% of classes and one participant missed 50% of the classes. Six CASP-19 questionnaires and four NIH questionnaires had missing responses. Across baseline and post intervention assessments there was a total of two missing NIH questionnaires and one missing EQ VAS questionnaire. Verbal feedback from all participants indicated that they enjoyed the dancing and felt a great social, relaxed and fun atmosphere prevailed at the classes. All participants were very satisfied with the volume of dance material

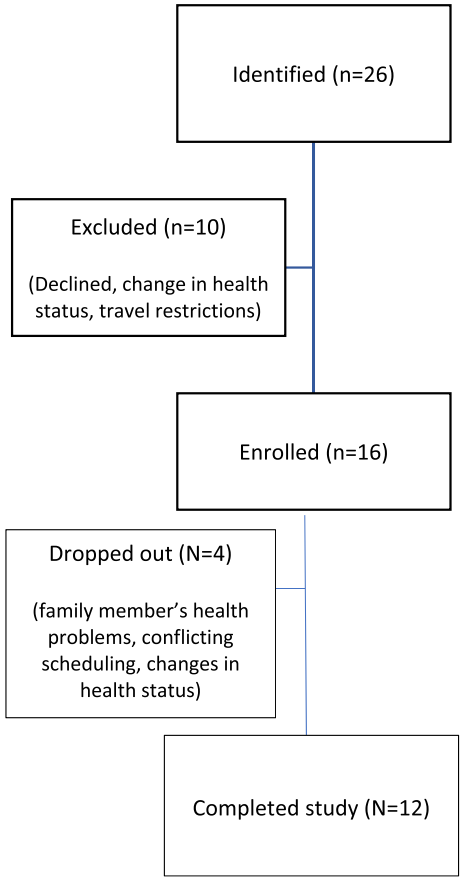

Fig. 1. Flow of participants in the study.

Table 1
Demographic characteristic of participants.

Demographic Characteristic (n = 12)	Values
Age (years)	73.9 ± 6.5
Gender (male:female)	2:10
Reported falling in the last 12 months, (n)	4
Level of Education, (n)	
Primary	3
Secondary	6
Third Level	3
Number of medications	2.0 ± 1.8
Previous dance experience (n)	12

Values for age and number of medications are mean ± standard deviation; gender is presented as a ratio of males to females; n = number of participants.

learned over six weeks. Only one participant handed back a home diary and completed less than 15% of the programme. The other 11 participants stated they "may have danced if a nice song came on the radio" but this only happened on one or two occasions. The main reason provided by participants for not complying with the home programme was that they preferred dancing in a class as it was more motivating and enjoyable.

There was a significant improvement in lower limb endurance measured on the 2-min step test. Part A and Part B of the trail making test demonstrated improvements that were not statistically significant. Table 2 presents the results of the physical and cognitive measures.

No significant changes were identified in quality of life or emotional health. Self-efficacy reduced, however, it was not significant (pre: 47.98 ± 13.86, post: 42.6 ± 9.43).

4. Discussion

The results of this study indicate that social dance is feasible in terms of safety, acceptability and adherence for community-dwelling older adults and may provide health benefits even in the short term. Social dancing was identified as a feasible form of physical activity in the community in Ireland, which may be due to the cultural role of dance in Irish society. With instructional input from a Chartered Physiotherapist, a social dance teacher safely delivered the well-attended classes. This is important as safely led community-based interventions have the potential to increase physical activity as well as reduce pressure on healthcare systems [31].

Evidence suggests that supervised exercise programmes promote adherence more than non-supervised programmes [32] and research in people with Parkinson's disease have reported low adherence to home dance programmes [17]. The findings of this study are comparable as the feasibility of the integrated home dance programme was found to be questionable. Participants did not complete the home dance programme and stated a preference for dancing in the supervised dance class. This finding may reflect the importance of social cohesion and peer support in dance participation. Murrock and Graor [33] found that dance classes can improve a sense of social acceptance and belonging as well as a continued desire for participation in socially isolated adults with depression. Physiologically, research suggests that positive social experiences can activate the mesolimbic dopamine system [34]. This results in elevated mood and behavioural choices that aim to reproduce these emotional states [34], thereby, motivating the desire to dance in a group environemnt. Contrary to the feasibility of a home dance programme, home programmes involving traditional forms of exercise or the use of exercise equipment have been found to improve long-term exercise adherence with higher adherence associated with the use of home exercise equipment [35]. Home programmes are one way to increase daily physical activity levels and reduce the travel and financial difficulties associated with attending physical activity classes [35]. As the number of older adults continues to rise and waiting lists for physiotherapy grow, research comparing the feasibility and effectiveness of different home exercise programmes is warranted. Technology-based programmes are becoming more prominent and a recent review found that older adults adhere to these exercise programmes [36]. However, research examining the long-term feasibility of these programmes is lacking. A technology-based home social dance programme may target the limitations of the home programme in this study and requires investigation.

There was a significant improvement in lower limb endurance in this study. After six weeks of social dancing, the mean result was approximately double the normative value for this age population [37]. This suggests that social dancing may be a suitable activity to maintain and sustain older adults' mobility levels in the community [37]. The improvement noted in this study was also larger than observed in high functioning older adults who completed 10 weeks of community exercise classes [38]. This may be due to the higher aerobic nature of social dance in Ireland and suggests that older adults with limited lower limb endurance may preferentially benefit from social dance. Improved endurance has also been reported after participation in 24 weeks of creative dance [39] and six weeks of Thai dance [40] in older adults. The results also suggest that the 2-min step test is a suitable measure to use in a large-scale trial. It was feasible to implement. It was less time consuming than a 6-min walk test of endurance and within the physical capabilities of the desired sample. This test is reliable and valid against the 1-mile walk test and time on a treadmill at 85% maximum heart rate [23], normative values for different age groups are available [37].

Recent literature suggests that the prevalence of emotional health problems are increasing in older adults [41] and are often predated by a period of loneliness, reduced social support and stress [42]. This study obtained data on the feasibility of the NIH toolbox emotional battery, CASP-19 and EQ VAS for measuring aspects of emotional health and

Table 2
Results of physical outcomes measures.

Outcome measure (N = 12)	Baseline	Post intervention	P value
TUG motor (sec)	10.54 ± 2.3	10.66 ± 2.47	[a]0.85
WWT (sec)	9.5 ± 1.24 (6.55, 11.58)	8.52 ± 2.66 (6.2, 16.19)	[b]0.53
2 min step test (no. of steps)	170.75 ± 19.90	212 ± 31.82	[a]0.003*
SPPB (points)	15 ± 2 (10, 16)	15 ± 2 (9, 16)	[b]0.61
Trail A (sec)	62 ± 29.67 (30.88, 253)	44.58 ± 23.83 (29.23, 92)	[b]0.06
Trail B (sec)	131 ± 98.5 (61, 235)	99.5 ± 50.5 (69, 323)	[b]0.18
Trail B-A (sec)	70.56 ± 93.72 (−133,171)	54.81 ± 58.59 (32,279.24)	[b]0.94

[a]Paired samples *t*-test; [b]Wilcoxon signed-ranks test; * = Significant finding; Results are mean ± standard deviation for TUG motor and 2 min step test, Results are median ± interquartile range (minimum, maximum) for WWT, SPPB, Trail A and Trail B; min: minute; no.:number.; sec: seconds; SPPB: Short physical performance battery; Trail A: Trail making test part A; Trail B: Trail making test part B; TUG: Timed up and go test; WWT: Walk while talk test.

quality of life. These measures were quick to implement and asked questions relevant to the lives of older adults. No significant changes were identified for these measures in the current study and it is recommended that these outcomes may be useful in larger trials to determine a change.

Dual task ability and physical function did not improve following the dance classes. The duration of the programme may have been inadequate to improve these outcomes. However, a short duration is preferable when examining the safely and acceptability of a programme. Additionally, the participants in this study scored very high in their baseline SPPB and this may have led to ceiling effect and an inability to detect change. Previous research found that eight weeks of dancing was sufficient to significantly improve SPPB scores in older adults with mobility limitations [43]. These results together with the results of the current study indicate that a more complex measure of physical function is required to capture change in higher functioning older adults. The Senior Fitness test [37] may be a suitable alternative measure. This test has been previously used in high functioning older adults. It is valid and reliable and assesses various parameters of physical function [23]. Social dance is hypothesised to improve dual tasking and physical function as it involves aerobic activity and simultaneous activation of cognitive, motor and music perception pathways [44]. Social dance also involves observing, actively mirroring and performing dance routines as well as processing and switching between verbal and auditory cues [44]. This multi-stimuli environment could improve cognitive function. The results of this study suggest that the trail making test is a feasible measure to use in future trials with this population.

5. Limitations

Due to the nature of this study, the number of participants was small and a large proportion of participants had previous dance experience. This limits the transferability of the findings to those who have never danced. However, the results provide preliminary information on the feasibility and benefit of social dance for older Irish adults and will inform future research. The invitation to participate in this study was extended to both genders, However, more females took part. Therefore, it is unknown if the findings can be extrapolated to males. While not within the remit of this study, a mixed methods design would have facilitated greater exploration of participants' attitudes and experiences of the intervention. It is recommended that future studies incorporate a qualitative evaluation or exit interviews to obtain rich data and further insight into the acceptability of the intervention and allow for appropriate modifications to be made in future trials.

6. Conclusion

This study provides evidence for the feasibility of social dance in Ireland and suggests that cognitive function and lower limb endurance can improve in the short term. Further large-scale trials are required to establish the effectiveness of social dance in the long-term.

Declaration of interest

None.

Acknowledgements

This research was funded in part by a Research Grant for Returning Academic Carers' from the University of Limerick.

References

[1] C. Daskalopoulou, B. Stubbs, C. Kralj, A. Koukounari, M. Prince, A.M. Prina, Physical activity and healthy ageing: a systematic review and meta-analysis of longitudinal cohort studies, Ageing Res. Rev. 38 (2017) 6–17.
[2] K.R. Westerterp, Daily physical activity and ageing, Curr. Opin. Clin. Nutr. Metab. Care 3 (6) (2000) 485–488.
[3] Department of Health, Ipsos MRBI, Healthy Ireland Survey 2016 Summary of Findings, (2016) Dublin.
[4] Centre for Disease Control and Prevention, National Health and Nutrition Examination Survey Data, (2011).
[5] J.A. Harvey, S.F. Chastin, D.A. Skelton, How sedentary are older people? A systematic review of the amount of sedentary behavior, J. Aging Phys. Act. 23 (3) (2015) 471–487.
[6] A. Devereux-Fitzgerald, R. Powell, A. Dewhurst, D.P. French, The acceptability of physical activity interventions to older adults: a systematic review and meta-synthesis, Soc. Sci. Med. 158 (1982) (2016) 14–23.
[7] F.C.E., The Irish céilí: a site for constructing, experiencing, and negotiating a sense of community and identity, Dance Res. 29 (1) (2011) 43–60.
[8] P. Murphy, Apples in Winter-Irish Set and Social Dancing, (2009) Ireland.
[9] J.-C. Kattenstroth, I. Kolankowska, T. Kalisch, H.R. Dinse, Superior sensory, motor, and cognitive performance in elderly individuals with multi-year dancing activities, Front. Aging Neurosci. 2 (2010) 31.
[10] J. Shanahan, L. Coman, F. Ryan, J. Saunders, K. O'Sullivan, O. Ni Bhriain, A.M. Clifford, To dance or not to dance? A comparison of balance, physical fitness and quality of life in older Irish set dancers and age-matched controls, Public Health 141 (2016) 56–62.
[11] J.-G. Zhang, K. Ishikawa-Takata, H. Yamazaki, T. Morita, T. Ohta, Postural stability and physical performance in social dancers, Gait Posture 27 (4) (2008) 697–701.
[12] T. Hansen, B. Slagsvold, Late-life loneliness in 11 european countries: results from the generations and gender survey, Soc. Indic. Res. 129 (1) (2016) 445–464.
[13] B.M. Luchesi, N.A. de Oliveira, D. de Morais, R.M. de Paula Pessoa, S.C.I. Pavarini, M.H.N. Chagas, Factors associated with happiness in the elderly persons living in the community, Arch. Gerontol. Geriatr. 74 (2018) 83–87.
[14] C. Quiroga Murcia, G. Kreutz, S. Clift, S. Bongard, Shall we dance? An exploration of the perceived benefits of dancing on well-being, Arts Health 2 (2) (2010) 149–163.
[15] A. Haboush, M. Floyd, J. Caron, M. LaSota, K. Alvarez, Ballroom dance lessons for geriatric depression: an exploratory study, Arts Psychother. 33 (2) (2006) 89–97.
[16] H. Moss, C. Donnellan, D. O'Neill, Hospitalization and aesthetic health in older adults, J. Am. Med. Dir. Assoc. 16 (2) (2015) 173.e11-173.e16.
[17] J. Shanahan, M.E. Morris, O.N. Bhriain, D. Volpe, T. Lynch, A.M. Clifford, Dancing for Parkinson disease: a randomized trial of Irish set dancing compared with usual care, Arch. Phys. Med. Rehabil. 98 (9) (2017) 1744–1751.
[18] S.M. Eldridge, G.A. Lancaster, M.J. Campbell, L. Thabane, S. Hopewell, C.L. Coleman, C.M. Bond, Defining feasibility and pilot studies in preparation for randomised controlled trials: development of a conceptual framework, PLoS One 11 (3) (2016) e0150205.
[19] S. Bredin, N. Gledhill, V. Jamnik, D. Warburton, Par-q +and eparmed-x+: new risk stratification and physical activity clearance strategy for physicians and patients alike, Cadian Family Physician 59 (3) (2013) 273–277.
[20] D. Treacy, L. Hassett, The short physical performance battery, J. Physiother. 64 (1) (2018) 61.

[21] E. Freiberger, P. de Vreede, D. Schoene, E. Rydwik, V. Mueller, K. Frandin, M. Hopman-Rock, Performance-based physical function in older community-dwelling persons: a systematic review of instruments, Age Ageing 41 (6) (2012) 712–721.
[22] M. Hofheinz, C. Schusterschitz, Dual task interference in estimating the risk of falls and measuring change: a comparative, psychometric study of four measurements, Clin. Rehabil. 24 (9) (2010) 831–842.
[23] B. Langhammera, J. Stanghelle, The senior fitness test, J. Physiother. 61 (2015).
[24] T.N. Tombaugh, Trail Making Test A and B: normative data stratified by age and education, Arch. Clin. Neuropsychol. 19 (2) (2004) 203–214.
[25] D. Merom, A. Grunseit, R. Eramudugolla, B. Jefferis, J. McNeill, K.J. Anstey, Cognitive benefits of social dancing and walking in old age: the dancing mind randomized controlled trial, Front. Aging Neurosci. 8 (2016) 26.
[26] A. Bowling, The psychometric properties of the older people's quality of life questionnaire, compared with the CASP-19 and the WHOQOL-OLD, Current Gerontology and Geriatrics Research 2009 (2009).
[27] C. Wilke, A. Puckard, Test-retest Reliability of the Eq-5d Visual Analog Scale across Populations and Conditions, EuroQol Group, Paris, 2009.
[28] R. Rabin, M. Oemar, M. Oppe, Eq-5d-3l User Guide. Basic Information on How to Use the Eq-5d-3l Instrument, EuroQol Group, Rotterdam, 2011.
[29] J.M. Salsman, Z. Butt, P.A. Pilkonis, J.M. Cyranowski, N. Zill, H.C. Hendrie, M.J. Kupst, M.A. Kelly, R.K. Bode, S.W. Choi, J.S. Lai, J.W. Griffith, C.M. Stoney, P. Brouwers, S.S. Knox, D. Cella, Emotion assessment using the NIH Toolbox, Neurology 80 (11 Suppl 3) (2013) S76–S86.
[30] W.J. Chodzko-Zajko, D.N. Proctor, M.A. Fiatarone Singh, C.T. Minson, C.R. Nigg, G.J. Salem, J.S. Skinner, American College of Sports Medicine position stand. Exercise and physical activity for older adults, Med. Sci. Sport. Exerc. 41 (7) (2009) 1510–1530.
[31] R. Wiles, S. Demain, J. Robison, J. Kileff, C. Ellis-Hill, K. McPherson, Exercise on prescription schemes for stroke patients post-discharge from physiotherapy, Disabil. Rehabil. 30 (26) (2008) 1966–1975.
[32] S. Rivera-Torres, T.D. Fahey, M.A. Rivera, Adherence to exercise programs in older adults: informative report, Gerontol Geriatr Med 5 (2019) 2333721418823604-2333721418823604.
[33] C.J. Murrock, C.H. Graor, Depression, social isolation, and the lived experience of dancing in disadvantaged adults, Arch. Psychiatr. Nurs. 30 (1) (2016) 27–34.
[34] S. Ballesteros, E. Kraft, S. Santana, C. Tziraki, Maintaining older brain functionality: a targeted review, Neurosci. Biobehav. Rev. 55 (2015) 453–477.
[35] T.W. Buford, S.D. Anton, D.J. Clark, T.J. Higgins, M.B. Cooke, Optimizing the benefits of exercise on physical function in older adults, PM&R 6 (6) (2014) 528–543.
[36] T. Valenzuela, Y. Okubo, A. Woodbury, S.R. Lord, K. Delbaere, Adherence to technology-based exercise programs in older adults: a systematic review, J. Geriatr. Phys. Ther. 41 (1) (2018) 49–61 2001.
[37] R. Rikli, C. Jones, Senior Fitness Test Manual, Human Kinetics, USA, 2013.
[38] R.C. Mason, M. Horvat, J. Nocera, The effects of exercise on the physical fitness of high and moderate-low functioning older adult women, J. Aging Res. 2016 (2016) 7.
[39] A. Cruz-Ferreira, J. Marmeleira, A. Formigo, D. Gomes, J. Fernandes, Creative dance improves physical fitness and life satisfaction in older women, Res. Aging 37 (8) (2015) 837–855.
[40] T. Janyacharoen, M. Laophosri, J. Kanpittaya, P. Auvichayapat, K. Sawanyawisuth, Physical performance in recently aged adults after 6 weeks traditional Thai dance: a randomized controlled trial, Clin. Interv. Aging 8 (2013) 855–859.
[41] S. Andreas, H. Schulz, J. Volkert, M. Dehoust, S. Sehner, A. Suling, B. Ausin, A. Canuto, M. Crawford, C. Da Ronch, L. Grassi, Y. Hershkovitz, M. Munoz, A. Quirk, O. Rotenstein, A.B. Santos-Olmo, A. Shalev, J. Strehle, K. Weber, K. Wegscheider, H.U. Wittchen, M. Harter, Prevalence of mental disorders in elderly people: the European MentDis_ICF65+ study, Br. J. Psychiatry : J. Ment. Sci. 210 (2) (2017) 125–131.
[42] Z.I. Santini, K.L. Fiori, J. Feeney, S. Tyrovolas, J.M. Haro, A. Koyanagi, Social relationships, loneliness, and mental health among older men and women in Ireland: a prospective community-based study, J. Affect. Disord. 204 (2016) 59–69.
[43] C.G. Bennett, M.E. Hackney, Effects of line dancing on physical function and perceived limitation in older adults with self-reported mobility limitations, Disabil. Rehabil. 40 (11) (2018) 1259–1265.
[44] P. Dhami, S. Moreno, J.F.X. DeSouza, New framework for rehabilitation – fusion of cognitive and physical rehabilitation: the hope for dancing, Front. Psychol. 5 (2015) 1478.