

Review article

Narrative Review of Dance-based Exercise and Its Specific Impact on Depressive Symptoms in Older Adults

Ray Marks *

Department of Health and Behavior Studies, Teachers College, Columbia University, New York, NY 10027, USA

* **Correspondence:** E-mail: rm226@columbia.edu; Tel: +1-212-678-3445; Fax: +1-212-678-8259.

Abstract: *Background:* Depression is a chronic condition that results in considerable disability, and particularly in later life, severely impacts the life quality of the individual with this condition. The first aim of this review article was to summarize, synthesize, and evaluate the research base concerning the use of dance-based exercises on health status, in general, and secondly, specifically for reducing depressive symptoms, in older adults. A third was to provide directives for professionals who work or are likely to work with this population in the future. *Methods:* All English language peer reviewed publications detailing the efficacy of dance therapy as an intervention strategy for older people in general, and specifically for minimizing depression and dependence among the elderly were analyzed. *Key words:* dance therapy and depression were included. Databases used were Academic Search Complete, Cinahl, PubMed, Scopus, PsycINFO, and Web of Science. *Results:* Collectively, this data reveal dance therapy may be useful as a rehabilitation strategy for older adults, in general, as well as for elders with varying degrees of depression, regardless of strategy employed. *Conclusions:* Although more research is needed, older individuals with or without chronic depression or depressive symptoms can benefit emotionally from dance based exercise participation. Geriatric clinicians can expect this form of exercise will also heighten the life quality of the older individual with depression or subclinical depression.

Keywords: aging; dance; dance therapy; depression; older adults; therapeutic use of dance

1. Introduction

Depression is a serious mood disorder associated with persistent feelings of sadness, loss of

interest and pleasure in daily activities [1]. In addition to feelings of hopelessness, and low self-worth, individuals suffering from depression may experience poor sleep patterns, fatigue, anxiety, depressive mood, apathy, anhedonia, interference with their daily activities, and appetite loss [1].

These symptoms, which may occur independently as a separate health condition, or in reaction to the persistent presence of other illnesses, and/or adverse life events and losses, including mobility losses, can arguably all influence quality of life and in the case of the presence of other illnesses, the extent of suffering and disability. Fortunately, depression can be reasonably well diagnosed by taking a careful history, and by applying one or more validated scales to examine if indeed the individual is depressed, and if so, how severe the condition is.

Research shows severe forms of depression affect 2–5% of the United States population. In addition, up to 20% of the population may suffer from milder forms of the illness, especially after 70 years of age [2], or if they suffer from medical problems, and/or chronic disabling pain. Despite the immense collective burden of this health issue, measures are not commonly put in place to identify or treat the prevailing depression expected to prevail in the older adult with and without one or more comorbid conditions in a holistic or integrated way [3]. In particular, depression is often overlooked as a cause of physical symptoms in the elderly, it is not recognized aging may alter psychosomatic states physiologically, and in those with more intense, frequent, and long lasting pain, where one can expect an increased risk of suffering from severe reactive depression [3]. Additional research clearly shows depression intervention is very crucial to securing the wellbeing of the aging person and is a factor of great import in the context of efforts to promote healthy aging [4]. However, while medication may be helpful in this respect, some may not be responsive to this or able to continue use of these long-term. The efficacy of medication to treat depression in older adults also wanes with time [5].

The ability to minimize the extent of any feelings of depression or definitive depression, in particular, is however, of high importance among the elderly, because its unrelenting presence can clearly impact the outcomes of co-existing physical illnesses quite adversely, along with overall life quality [6,7]. Moreover, left untreated, depressive symptoms may produce a greater likelihood of premature death, appetite changes, increased blood pressure, memory challenges, a decreased desire for physical activities, including libido loss, weakness, trouble sleeping, anxiety, social withdrawal, and higher rates of bone resorption, hospitalizations or nursing home placements [2,4,7].

1.1. Classification of depression

Commonly diagnosed based on criteria in the Diagnostic and Statistical Manual DSM-IV, a diagnosis of a major depressive disorder is made when a certain number of manual items prevails, including, depressed mood, trouble concentrating, hopelessness, feelings of worthlessness, reduced motivation, decreased drive and reward for pleasurable activities, too much or too little sleep, doom and suicidal thoughts occur for more than two weeks [7,8]. However, not all forms of depression are the same, and attempts have been made to categorise subtypes as defined by their unique symptoms [8].

Accordingly, depression can occur in mild, moderate, or severe forms [7], and the diagnosis of depression due to a general medical condition is given when a depressed mood or anhedonia occurs in those patients already diagnosed with an illness associated with depression [2] (See Table 1 for the broad classification of depressive symptoms and definitive depression).

Table 1. Brief description of the different forms of depression [Adapted from references 7,8].

Subtypes	Key Characteristics
Major depression	Long lasting changes in energy, thinking ability, esteem, preoccupation with death and suicide
Melancholic depression	Severe symptoms of sadness, low self-esteem, low energy, fatigue, no reaction to positive events, inability or reduced ability to feel pleasure
Reactive depression	Moderate symptoms; usually in response to external factors
Psychotic depression	Severe symptoms associated with psychosis, delusions
Atypical depression	Associated with labile mood, sleeplessness, increased appetite, weight gain
Catatonic depression	Severe reduction in movement and responsiveness, extreme over-activity, extreme negativity
Dysthemia	Milder symptoms, but more long-lasting

1.2. Treating depression

Since depression is one of the most important predictors of health practitioner visits [9], and can lead to suicide, as well as considerable physical, and social disability [10], minimizing, preventing or treating depression is strongly indicated among the older population. Interventions that can address depression may include counselling, psychotherapy, medications, cognitive behavioural therapy, exercise, and social support among other approaches. Treating comorbid conditions, while enhancing coping skills, may also be beneficial given that a large proportion of older adults with musculoskeletal pain are found to exhibit high rates of depressive symptoms [11–13]. Moreover, to minimize medical costs, as well as higher than necessary rates of symptom expression and pain among older people [1,14], appropriate personalized or tailored interventions for older adults are essential.

Alternately, if left untreated, older adults with depression may exhibit high levels of non-compliant behaviors, activity avoidance, catastrophizing, and passive coping styles [3]. They may exhibit a higher prevalence of psychopathology, and excess disability than non-distressed patients [15].

Exercise is the single most important strategy that may potentially prevent excess cognitive decline common in adults with aging [16]. In particular, a variety of dance routines may prove extremely useful in this respect. Based on studies in a variety of populations, it has been suggested that dance based exercise in particular, or some form of dance therapy, may confer important mood and/or cognitive effects on older populations [5], yet little definitive current information on this topic prevails, with respect to the older adult, despite its apparent potential clinical utility.

1.3. Aims

This narrative review consequently aimed to specifically examine the value of dance based therapy on the wellbeing of older adults, in general, and in particular, as a strategy for alleviating or minimizing depression in the older population. A third aim was to offer recommendations for clinicians and researchers in the field based on these findings.

2. Materials and Methods

To obtain the data for this review, the electronic data sources Academic Search Complete,

Cinahl, PsycINFO, PubMed, Scopus, and Web of Science were searched. The years searched ranged from January 1966–September 2015 and key words included dance, dance therapy, depression, older adults (See Table 2). Many articles were reviewed and screened to identify those that focused on the topics of relevance to this paper. Excluded were studies focusing on children, adolescents, adult populations younger than 60 years of age, health conditions other than depression, emotional eating, obesity, dancing and falls risk, dance therapy and quality of life, cognition, interpersonal competence, body image, and satisfaction, plus non-English based articles. To examine the theory and rationale for the application of dance-based therapy on health attributes of older adults, in general, this body of information was read and analyzed first. Thereafter, the body of related research on dance and depressive symptomology in older adults, in particular, was read and carefully examined. Because only a limited number of empirical studies related to the effect of dance therapy on depressive symptoms among older adults using a randomized controlled trial design was found, and no consistent intervention or outcome evaluation methodology could be identified among these trials, all available studies including case studies, and quasi experimental uncontrolled single group pre and post-test studies on any form of dance, even vicarious dance interventions, were deemed eligible for review. All studies where the authors used some form of dance intervention and assessed depressive symptoms in some way were retrieved, regardless of presence or absence of a depression diagnosis. These reports were subsequently categorized according to their research design—an indicator of methodological quality—using the Levels I-IV evidence approach discussed by Klein and Adams [17].

Table 2. Data bases employed and results.

Database	Key words	Years	Result
Academic Search Complete	Dance and depression	1995-2015	22
	Dance therapy and depression	2005-2015	6
Cinahl	Dance and depression	1998-2015	10
	Dance therapy and depression	2005-2014	3
PsycINFO	Dance and depression	1981-2015	177
	Dance therapy and depression	1981-2015	50
PUBMED	Dance and depression	1975-2015	127
	Dance therapy and depression	2007-2015	69
Scopus	Dance and depression	2011-2015	209
	Dance therapy and depression	2011-2015	109
Web of Science	Dance and depression	1993-2015	168
	Dance therapy and depression	1993-2015	69

3. Results

A total of 70 articles relevant to the topic of dance therapy and older adults in general were retrieved after a careful examination of the data bases housing potential articles. In terms of the specific topic of dance as an intervention to impact depression in older adults, only 15 articles met the present reviewers' inclusion criteria. Among these 15, there was considerable variation in the samples studied, venues employed for the studies, dance modes and frequency employed, age range,

health status of participants, outcome assessment procedures, and types of articles reported. Most studies in this realm focusing on healthy older adults and dance therapy interventions were found to have very few subjects with one or more typical chronic health condition, and almost none focused on subjects having depressive symptoms. That is, among the available publications related to dance therapy and older adults, the majority did not assess dance therapy in relation to depression, rather these discussed dance therapy in terms of its effect on cardiovascular fitness, or falls and balance among other topics. These results are recorded below in narrative form.

First, dance as a form of therapy is discussed in order to provide insight to the utility of dance as a viable strategy for improving overall health status among older adults. Thereafter, the specific evidence of dance therapy as an intervention is reported in narrative form according to the degree of or quality of the evidence provided by the research.

3.1. Dance as a therapy

Dancing is a form of exercise shown to employ a combination of structured and unstructured movements that can minimize performance declines associated with aging [19]. Dance movement therapy, an established profession [20], can also serve an important complement to other forms of therapy that are commonly used to alleviate long-lasting and chronic pain, often leading to depression. Dance therapy has also been shown to help people overcome health problems that result in physical limitations and disability as well as psychological distress, and to foster their self-esteem or self-concept and body image [21]. Dance therapy can not only induce relaxation, and improve muscle tone, it can increase balance and physical performance [22], evoke widespread positive effects including cognitive, and motor performance, and feelings of subjective wellbeing that are not based on selection bias [19]. Among elders who participate in dance therapy, researchers have observed that the process of movement based on a specific theme, often elicits positive memories, and provides opportunities for socializing [23]. This outcome potentially increases opportunities for social support, and self-expression [24], deemed to promote health status, and importantly, can be observed, regardless of whether dance is presented in a vicarious manner, or as a direct therapeutic intervention [25].

It has also been observed that dance-based aerobic exercises can improve the balance capacity, as well as the walking and agility profile of the older participant [25]. Dance participation also has the potential to strengthen executive function, plus the integration of emotional, physical and social determinants of health [20,26,27], and life satisfaction of older women [28] (See Box 1). Moreover, performed individually or in a group, dance based therapy may be extremely helpful for improving the mobility and functional capacity of older people with arthritis who cannot participate in vigorous or stressful aerobic exercises [29]. In the context of this present review, participation in dance based exercises has been found to relieve feelings of psychological distress among individuals with health challenges [21,30], including, anxiety and depression [20,21]. It was consequently deemed likely that because dance therapy or dance participation, is readily enjoyed by older adults [29], it would be found to be a helpful strategy for promoting their physical and psychological wellbeing, regardless of health status [31]. Importantly, in the context of exercise participation, and its impact on depression, it was further believed dance would be found to have a positive impact because it is commonly perceived as ‘fun’ rather than a chore [23]. Moreover, the fact that dance is not only seen as a

pleasurable activity for most older people, but also an important social activity, was thought to be an additional positive attribute of this form of physical activity, even if the participant had been quite sedentary previously [25].

3.2. *Dance therapy and depression*

As outlined above, several lines of evidence from a variety of studies have supported the efficacy of dance based therapy as a helpful and safe form of exercise for older adults, and adults with depression. Very few studies however, have focused specifically on examining elderly samples, and whether dance can assist in alleviating depressive symptoms, when present. A small number that have been published are detailed below according to the level of evidence of the research employed.

3.2.1. Level III or uncontrolled studies

Among the few studies retrieved from the present search, the research study conducted by Alpert et al. [32] examined the effect of a modified jazz dance on balance, mood, and cognition of older adults. The study design was a 15-week long prospective one of one group where data were collected by self-reported questionnaires and a balance tool at three time periods. Comparisons between the dependent measures were then made across these three time periods. The group consisted of women 50 years of age or older, and 15 individuals, mean age, 68 years, with a standard deviation of 8.6 years were recruited. All but one subject was Caucasian, and all were deemed healthy with no overt psychiatric illness. Differences in the depression and mental health scores post-intervention were not significant. However, it should be noted that the therapy was applied to a healthy group already enrolled in a senior's dance program.

In a feasibility study of a more disadvantaged sample, Blandy et al. [33] elected to examine the use of therapeutic Argentine tango dancing for older people with Parkinson's disease. In this study, six community dwelling individuals with mild to moderate disease attended a one hour dance class at a dance studio twice per week for four weeks. This was led by a professional instructor, who was assisted by physical therapists—as required. Outcomes were adherence, and safety, and secondarily depression and quality of life. Therapy outcomes were assessed at baseline and after the intervention and showed good program adherence, with significant improvement in depression scores. The program was deemed both safe and feasible. The authors concluded that persons with more advanced disease might benefit even more from this type of intervention.

3.2.2. Level II or controlled studies

Among the controlled studies retrieved, research by Eyigor et al. [22] examined the impact of Turkish folklore dance on balance, quality of life and depression among 40 healthy older women over age 65. The program of dance was eight weeks in length, and subjects were randomized to a control or an experimental group. The physical and mental health function tests appeared to show the experimental group outperformed the control group over time. But no change was noted in depression score. However, subjects were all healthy with no evidence of major depression or

cognitive impairment.

In a study by Cross et al. [25] that included 100 elderly residents with various degrees of ill health located at a board and care facility, dance as a vicarious intervention was assessed. After excluding those who had received diagnoses of Alzheimer's disease, dementia, or severe depression, the eligible participants were allocated to either a 30 minute music listening session or to music plus seeing a dance session. The dance group included 22 men and 28 women, mean age 76. The music group included 25 men and 25 women with a mean age of 77. All participants completed a depression survey at baseline and six weeks. While both groups improved their depression scores, the improvement was greater for the dance group even though no active dancing was undertaken.

Zhang et al. [34] conducted a 5-group controlled study where older adults 60–70 years of age were exposed to an 18 month long dance or exercise program designed to affect cognitive function and emotional status. Thirty subjects were included in the dance group, who performed exercises 30–60 minutes 4 days per week at a moderate intensity of 65–75% resting heart rate. Although their health status was not clarified, it was said to be equal at baseline to that of the other 3 intervention groups in terms of depression. Among those who completed the 12-month follow-up, depression scores were improved to the same degree as those who performed various forms of exercise over the same time period. The depressive scores were significantly better than those of the control non-intervention group.

An earlier study that somewhat supported these aforementioned findings was that of Jeon et al. [35] who examined the effects of an actively performed Korean traditional dance program on depression, balance, falls, and medical utilization of older women in a quasi-experiment that used an experimental and control group. In this study, the experimental group participated in a 12 week dance program three times a week for about two months. The researchers reported significant improvements in all the measured variables compared to the control group, but it is unclear if groups were comparable at baseline and whether their activities over the study period were controlled for or not. In a somewhat different study reported by Lewis et al. [36], the authors analyzed the presence of mood changes among elderly Parkinson's disease patients, mean age 65 years after exposure to social dance sessions. They examined 22 patients and 15 age-matched controls before and after a 10 week dance program, conducted once a week by a qualified instructor. An overall decrease in mood disturbances was observed in both groups, suggesting the intervention is useful, regardless of prevailing health status.

A similar conclusion was reached following a pilot study conducted by Haboush et al. [37] that examined ballroom dance lessons and their effect on geriatric depression of 20 older community dwelling elders that had a positive effect on depression. In this study participants randomly assigned to an active or a delayed intervention group all received eight ballroom dance lessons on a variety of dance options. There were medium size effects for the depression outcomes, suggesting this approach can lessen depressive symptoms in older adults. In addition, although the small sample size precluded conclusive findings, all participants agreed the dance lessons were enjoyable.

Pinniger et al. [38] who conducted a randomized controlled trial that included participants up to age 80 years, although the mean age was around 44, examined the utility of Argentine tango dance compared to mindfulness meditation and a waiting list control on depression. Ninety seven individuals with self-declared depression were randomized into the three groups. Active participants

completed a six week dance or meditation program. Measures of depression were made before and after the intervention. The active groups had a decreased overall depression rating compared to wait listed controls. Dance uniquely reduced stress and improved mindfulness. There were quite a few dropouts in this study though as only 66 completed this. Vankova et al. [39] conducted a randomized controlled trial in a nursing home based on a program called the Exercise Dance for Seniors (EXDASE) Program. The activity took place once a week for 60 minutes for 3 months. Their baseline measures included the ability to perform basic, as well as instrumental activities of daily living, basic mobility, self-rated health, and cognitive status. Other assessments conducted before and after the intervention included an assessment of depressive symptoms using the geriatric depression scale (GDS). Results showed patients in the exercise group had significantly improved depressive scores ($p = 0.005$), whereas the control group showed further worsening of their depressive symptoms ($p = 0.081$). Other analyses led the authors to conclude that dance therapy may decrease depressive symptoms even in participants with minimal depression levels and may result in more discontinuations and fewer prescriptions for antidepressants. This study provided evidence that dance based exercise can effectively reduce the amount of depressive symptoms among nursing home residents, despite their generally poor health status, and that the effect was not influenced by controlling for intake of antidepressants.

Von Rossberg-Gempton [40] conducted a study that examined the effects of creative dance for enhancing social-affective functioning and other correlates of wellbeing among elders and children. Three different group activities were reviewed—(1) dance, (2) exercise, (3) physical education for 12 weeks twice a week. Among other health benefits, creative dance was found to increase positive emotions and decreased negative emotions in the adults. A deterioration in dance related physical skills correlated with an increase in depression (see Table 3 for overview of controlled studies).

4. Critical Evaluation of Dance Therapy Studies

As outlined in the aforementioned sections of this paper, the reports documented in this review were very limited in number, and were not all high quality randomized controlled trials with comparable samples sizes. Their designs varied from single group pre and post-tests to randomized controlled trials. A majority used multiple measures and interventions, focused on different age groups, and groups with varying degrees of depressive symptoms. Dance strategies varied in duration, type, frequency, intensity and mode of delivery, hence, the present findings could not be synthesized effectively. Moreover, even when randomization occurred, groups were not necessarily diagnosed similar at baseline, medication intake was not always discussed, the concurrent use of other treatments was not specified, and adherence was not always consistently assessed. Thus, more work is needed to scientifically support the efficacy of dance therapy for the control of depressive symptoms in older adults according to the criteria of Verhagen et al. [41], even though several short-term studies suggest that symptoms of depression, such as impairment in cognitive functioning, are enhanced by dance therapy participation [20], as is also mood [67]. More work to examine the long-term impact of dance on depression among older people, and efforts to ensure assessors are blinded, will help to support the precise benefit of dance therapy for older adults with depressive symptoms. Until then caution is advocated in interpreting these generally beneficial health and

mental health benefits observed in a variety of research studies (see Box 1 and Table 3). In addition, the impact of instructor, health status, intervention mode, pain, plus the participant's past experience should be examined to arrive at any universal conclusion.

However, in the context of many disease related problems experienced by older people, it is the present author's view that the potential utility of dance for improving depression related issues should not be overlooked even if much more research on this topic is indicated in the future. Of specific clinical importance to people with depression who cannot take medication is supportive evidence that dance participation can yield significant health benefits [20]. Along with its mood mediating effects, the beneficial effects of dance interventions on other health correlates are also noteworthy. This is because one or more of these outcomes may prevent depression onset in those at risk, or reactive depression due to secondary conditions associated with aging such as falls, fractures and arthritis. In addition, integrating dance with traditional treatments of depression, such as cognitive behavioral therapy, may yield important health benefits that are presently overlooked [70].

5. Discussion

Although modern medicine has been successful in extending life, new approaches towards enhancing quality of life for the growing population of older adults are becoming essential. In this regard, a growing evidence base suggests that many older adults will not only suffer from age-associated physical disease, but they will also suffer at substantive rates from a range of depressive symptoms or from definitive depression, which is a highly negative health state, often overlooked, or not always responsive to medication therapy alone. Fortunately, the literature reveals, a plethora of data espousing the proven benefits of exercise, both in the context of general healthy aging and depression relief as a possible alternative therapeutic approach. Among the forms of exercise that are advocated in this regard, the literature reveals dance therapy, which has numerous health-associated benefits and is a low-risk activity for potentially promoting cognitive wellbeing, as well as mobility and function among older adults [53], even among those with chronic disabling diseases [44]. Other benefits of dance therapy are that dance exercise can be carried out without extensive forms of technology or special equipment, regardless of socio-economic status or access to a health facility or provider, and has quite impressive mental, physical, and social-emotional health benefits as outlined in Box 1. Additionally, carried out in the context of a group setting, either in the community as well as nursing homes, or even if only for a single 75-min session [67], dance participation may provide for improvements in global mood [67], as well as socially supportive benefits [53] that foster wellbeing and life quality [56]. Dance therapy intervention, which can also be applied vicariously with positive mood associated benefits [25], is beneficial to the mood state and wellbeing of the older dementia patient residing in a care home [69].

In addition, benefits have been observed among those with symptomatic, rather than clinically defined depression [16], those with serious persistent depression [45] those who are stressed [56] or exhibiting a negative affect [46], regardless of health or clinical status or mode of delivery, even if this is not the conclusion reached by Meekums et al. [50]. Dance therapy, commonly associated with an exercise intensity that may be less injurious to joints than commonplace high intensity exercises, often advocated for improving aerobic capacity, may also impart important physical health benefits

to the participant with pain that is likely to foster independence and wellbeing [63], and to minimize the tendency towards reactive depression in these patients. Programs using alternative exercise approaches such as dance may also prove especially beneficial for those patients who are depressed and who cannot take medication, with effects comparable to pharmacologic and verbal psychotherapies [20,65].

Given the general health benefits demonstrated in the majority of studies reported in this review, the immense magnitude of public health problems caused by depression and the failure of medical technology and pharmacotherapy to single-handedly maximize quality of life among older adults, it appears that more research to examine the efficacy of dance therapy for minimizing or ameliorating the presence of depressive symptoms among older adults would be highly advantageous. In particular, comparative studies to examine what forms of dance as well as what dosages of these can yield optimal results, long-term follow-up studies, and the use of validated outcome instruments would undoubtedly strengthen the potential to enhance healthy aging and to reduce the magnitude of disability incurred by those elderly suffering from some form of depression.

6. Conclusion

Depression, which poses an enormous burden on society, is a highly prevalent chronic disabling disease, especially among the older population. To assist older adults to acquire a better quality of life, notwithstanding the limitations of the aging process, the research stresses the importance of exercise. As a form of exercise, dance demonstrates many positive physical and psychological benefits. Useful to promote wellbeing among the healthy and among those who are impaired, dance therapy appears to confer beneficial mood changes on the older population, and without the damaging side effects of medications. Easy to apply in both community, as well as nursing home settings, dance seems to be an attractive form of exercise enjoyed by the majority of older adults that have been studied, regardless of mode, and that can serve as a bridge to promote psychological health. However, in light of the limitations in the prevailing evidence, to advance with this form of therapy, health educators and other clinicians may want to proceed to engage in research to verify the efficacy of this approach, as well as the optimal dosage for varying health conditions and physical abilities. In the meantime, it seems reasonably safe to encourage older adults who have never thought about practicing dance to consider doing so, and to provide primary care practitioners, nursing homes and similar venues with information about the potential benefits of this mode of intervention. In particular, they could be proactive in finding sites where their clients might be referred to in the community for initial assessment and training and in recommending certified instructors and related programs in the community to them; educate their families and caregivers; and organize the personnel at aging centers about the potential benefits of dance interventions so that they can assist them in a supportive way. Those with comorbidities such as Parkinson's disease, as well as those in nursing homes who may be especially benefited should not be excluded. By participating in structured classes carried out actively twice a week or even passively by observing dance performances modest to clinically significant improvements in depressive symptomology may be realized, regardless of intervention mode. In light of the potential for dance therapy to impact positively upon the older adult, and to avert the disabling consequences of depression on healthy

aging, we strongly encourage efforts directed towards designing and conducting high quality trials to validate and replicate the potential of dance therapy to ameliorate older adult depression using larger samples, given its potential currently demonstrated in various contexts.

Box I. Specific outcomes of dance-based therapy that could promote well-being among older adults.

- Increased aerobic capacity
- Improved balance [26,30,33,45]
- Improved emotional expression and engagement [33]
- Improved executive function [19,27]
- Improved fitness
- Improved flexibility
- **Improved functional ability**
- Improved general health status
- Improved life satisfaction [28]
- Improved memory recognition [25]
- Improved mood state
- Improved motor performance [19]
- Improved muscle strength
- Improved muscle tone
- Improved physical fitness [28]
- Improved posture [19]
- Improved proprioception
- Improved psychophysiological dynamics [49;52]
- Improved quality of life [45,52,56]
- Improved reaction time [19]
- Improved social adaptation [52]
- Improved social skills [40]
- Improved vitality [20]
- Improved walking ability [26]
- Improved well-being [19,58]
- Reduced anxiety [53]
- **Reduced depression [20,38,45,60]**
- Reduced disease severity [30]
- Reduced pain
- Reduced stress levels [38,57]
- Postural improvements
- Spatial cognition improvements [30]
- Weight reduction

Table 3. Summary of key points of a sample of controlled studies of dance for older adults in context of depression.

Authors	Sample	Dance mode	Results
Cross et al. [25]	100 elderly board and care residents	30 min musical dance observation vs music alone	Group observing dance had more profound depression benefits
Haboush et al. [37]	20 depressed older adult	8wk ballroom dancing	Medium size effects on depression were observed
Hackney/Earhardt [43]	58 older adults with mild Parkinson's disease	Tango or foxtrot vs control group, 1hr 2 × wk	Participants noted mood improvements
Hashimoto et al. [66]	46 older adults with Mild Parkinson's disease	60-min dance or ex for 12 wks	Self-rating depression was significantly better after the intervention in dance group
Hui et al. [31]	111 community dwellers	23 dance sessions structured dance	Dance appeared beneficial
Jeon et al. [35]	130 experimental 123 control subjects	12 wk Korean dance program	Depression status improved
Koch et al. [20]	31 psychiatric patients	Single dance intervention	Dance group had less depression than control groups
Lee et al. [55]	20 older patients with Parkinson's disease	30 min of dance exercise plus standard care	The virtual reality dance exercise had a positive benefit on depressive symptoms
Lewis et al. [36]	22 Parkinson's patients 15 controls	10-week social dance	Mood improved in both groups
Pinniger et al. [38]	7 depressed adults	Argentine tango × 6 wk	Depression was reduced in tango group
Sun et al. [60]	Older Chinese adults	15 m Tai Chi/dance	Program reduced depression
Vankova et al. [39]	60 nursing home adults	3 m dance program	Dance reduced depressive symptoms
Zhang et al. [34]	150 subjects ages 60–70	Square dancing ×18 m	Depression at 12 m was decreased compared to control non intervention group

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