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Research article

Characterization of dance-based protocols used in rehabilitation - A systematic review

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ABSTRACT

Objective: To describe the use of dance-based intervention protocols as a rehabilitation proposal.
Method: Papers containing protocols used in adult patients and written in Spanish, English, and Portuguese were collected using the following keywords: Physical Therapy; Dance Therapy; Rehabilitation; and Clinical Trial Protocol. The PUBMED, MEDLINE, LILACS, BVS ScienceDirect, PEDro, OTseeker, The Cochrane Library (Cochrane Central Register of Controlled Trials), and Scopus databases were used for the collection of information to define the type of dance, the established protocol, pathologies, and the population involved.
Results: 70 studies met the eligibility criteria, all of which presented a dance protocol. This was used in the rehabilitation of pathologies covering the neuromuscular, musculoskeletal, and cardiovascular systems, as well as in a healthy population. Positive results were the main outcome measure.
Discussion: Dance is an innovative intervention strategy for patients with comorbidities or underlying pathologies as well as for those in good health. It offers, without limitations, a field of applicability through the use of a dancing style as a rehabilitation process, generating significant changes in the physical, mental, and social skills of the individual.

1. Introduction

Dance is one of the most primitive forms of human communication and expression, and is considered to be one of the most synchronized activities performed by the body [1]. According to the American Dance Therapy Association, dance is the psychotherapeutic use of movement to promote emotional, cognitive, physical, and social integration of the individual [2]. Therefore, it involves cognition as a fundamental part of its execution [3], and it is based on learning motor sequences, implicit or procedural memory, attention, timing, and physical effort, among others [4]. Consequently, it is evidenced that the use of dance as therapy in rehabilitation processes leads to benefits in these different systems. It is considered to be a form of physical exercise that incorporates innovation, creativity [5], and strategies for the prevention of health conditions associated with age [6].

Similarly, dance provides variability in its execution due to its low cost and practicality, and the fact that it is made up of different styles, with different steps and rhythms involved — from folk/traditional dance to ballet, ballroom dance [7], Tango [8], Latin and seniors dancing [9], among others. This suggests that it is a beneficial type of physical exercise, since dancing has the power to contribute to an optimal and sustained participation in physical activity [10]. Not only does it influence people at the psychological level and affects people's moods, but also implies the experience of fluid movement, posture and body control, which is considered to be an adjuvant therapy when dealing with stiffness, bradykinesia, and postural instability associated, for example, with Parkinson's disease [11]. This was determined based on the physiological impact of dance on the body, and as a result of the identification of several studies that showed the effects of dance on the improvement of functional capacity, balance, and strength [12].

Various clinical trials using dance as an intervention strategy evidenced a minimal dropout rate when compared with traditional physical exercise interventions, in which an increase in people's disinterest in participating in clinical studies or continuing with their rehabilitation process were identified [13]. Studies implementing dance protocols in order to identify health effects reflected those participants described it as

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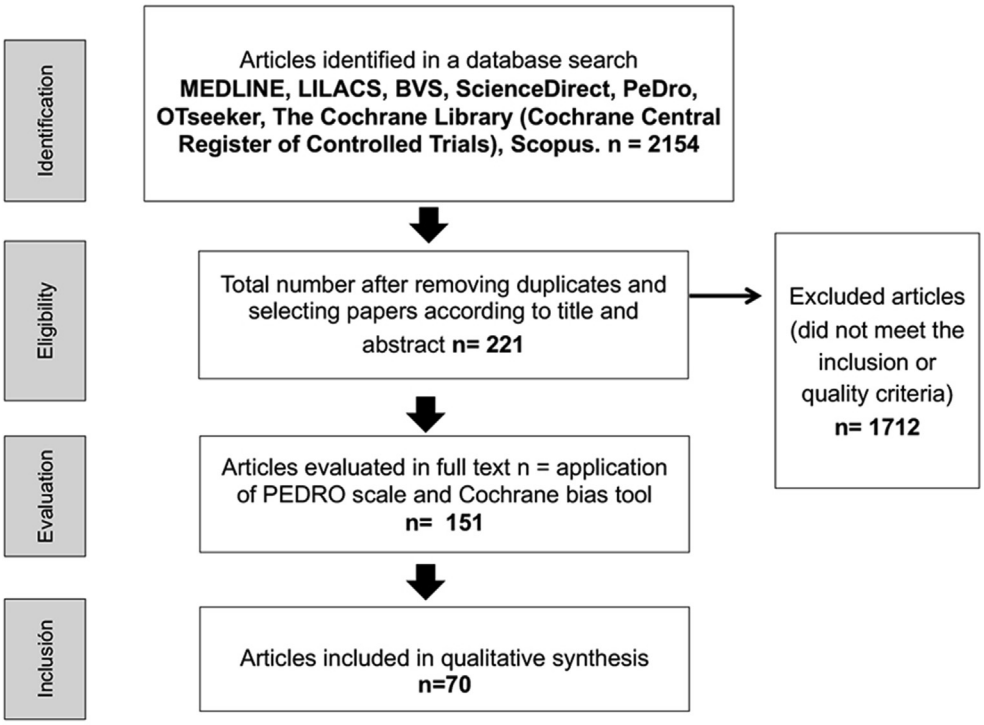

Figure 1. Search and selection of studies for systematic review according to the PRISMA statement. Our source.

a pleasant, innovative [14], and safe method of achieving the expected results, generating permanence and an increase in attendance to scheduled sessions [15]. It is important to highlight that this review was developed with the purpose of expanding and describing the main dance-based intervention protocols that are used in cardiopulmonary, musculoskeletal, and neuromuscular rehabilitation. The main results of this study are presented in a comprehensive manner, establishing guidelines for the development of the interventions.

2. Methodology

This study followed the Cochrane Collaboration specifications for systematic reviews [16], the criteria included in the PRISMA checklist [17], and the criteria specified in the PICO question. The protocol was registered in the International Prospective Register of Systematic Reviews, PROSPERO as CRD42020191480.

3. Eligibility criteria

- Population: People over 18 years of age who have undergone a process of dance-based rehabilitation.
- Intervention: Dancing (any type of study that reports on the use of some type of dance as a rehabilitation strategy).
- Comparison: Conventional therapy or no intervention.
- Results: Time of intervention, type of dance, objective of the intervention, pathology in which it was used, results of the intervention according to a primary measure.
- Type of study: We included clinical trials, controlled clinical trials, and pilot studies that included the type of intervention and outcome measures.
- Exclusion criteria: Studies where musicalized interventions were included, but with no specification on the use of dance or a different modality than the description included.

3.1. Information source and search strategy

The search was carried out in the following electronic bibliographic databases and search engines: MEDLINE, PUBMED, LILACS, BVS ScienceDirect, PEDro, OTseeker, The Cochrane Library and Scopus. The search strategy included Dance Therapy and Rehabilitation. MeSH terms and the International Prospective Register of Systematic Reviews were applied. The MEDLINE search strategy is available in the published protocol. The word "Dance" was always used as a combined search criterion (using the AND connector) with Rehabilitation, Dance Therapy, Clinical Trial Protocol, Dance Kind, and Conventional Therapy. They were limited to studies in Spanish, English, and Portuguese, but there was no restriction on published dates. Searches were carried out between 05/15/2020 and 06/03/2020.

3.2. Selection of studies

A calibration process was carried out during the selection of studies, which was stopped when there was agreement of at least 100% regarding the articles to be included. Two investigators (LTO and MFH) initiated the filtering actions blindly and independently after searching the different databases. Each investigator produced a list of studies after analyzing the title and abstract of each article, and studies were included if there was agreement between the reviewers. In the cases where the answer differed, a consensus was made, taking into account the quality and the data retrieved. In the final selection, eligibility criteria were applied to the full text analysis.

3.3. Data collection process

Data collection was carried out independently, using a format generated with Microsoft Office Excel (MFH and LTO) and considering the following: primary author, year, country, research design, sample size, age, dance-based intervention, comparison procedure, time per

Table 1. Summary of studies investigating dance-based therapy compared to other interventions in neurological patients.

Reference	Description/diagnosis/ sex/age	Study design/number of sessions/evaluation program	Intervention	Results	
Neuromuscular system					
Akandere, M; Demir, B [20]	Depression, males and females D.I.G: (n: 60), 20 years C.G: (n: 60), 24 years	Randomized controlled trial 36 sessions. Beck depression scale	D.I.G: Rumba and rumba waltz 110 Minutes C.G: without intervention -12 weeks	D.I.G: the study found significant intervention-time interaction in favor of dance Therapy 12 weeks	C.G: There were no changes
Borges, E.G.D.S [21]	Dementia, 66 years D.I.G: (n:30) C.G: (n:30)	Simple randomized clinical trial. 36 sessions. -MMSE, PBA, GDLAM	D.I.G: Ballroom dancing 50 min. C.G: Normal daily activities -12 weeks	D.I.G: the study found significant interaction in favor of dance therapy in MMSE, PBA, GDLAM	C.G: There were no changes
Cheng, S.L [22]	Schizophrenia, males and females D.I.G: (n: 26), 43 years C.G: (28), 47 years	Experimental study with convenience sampling 16 sessions. -BW, BMI, ME, flexibility, CE	D.I.G: Aerobic dance 60 min. C.G: without intervention 8 weeks	D.I.G: the study found significant intervention-time interaction in favor of dance Therapy 8 weeks	C.G: There were no changes
Hashimoto, H [23]	Parkinson, male and female D.I.G: (n:15), 67 years C.G: (n: 17), 62 years	Randomized controlled trial 12 sessions. - TUG, BBS, FAB, MRT, AES, SDS, UPDRS	D.I.G: Unspecified dance 60 min C.G: Exercise and Normal daily activities 12 weeks	D.I.G:: the study found significant interaction in favor of dance therapy in TUG, BBS, FAB and in response time MRT, AES, SDS and UPDRS	D.I.G: There were no changes
Hulbert, S [24]	Parkinson, male and female D.I.G: (n: 15) C.G: (n: 12)	Randomized, controlled experimental trial. 20 sessions. -3DGA, eye movement: HFCS	D.I.G: Ballroom dancing 1 h C.G: without intervention 10 weeks.	D.I.G: the study found no significant intervention-time interaction	C.G: There were no changes
Kaltsatou, A [25]	Schizophrenia, male and female, 59 years D.I.G: (n: 16) C.G: (n: 15)	Randomized controlled trial. -6MWT, STS, BBS, LST, GAF, PANSS, Q-LES-Q-SF	D.I.G: Traditional Greek dance 60 min C.G: without intervention 8 months.	D.I.G: the study found significant intervention-time interaction in favor of dance Therapy 8 months	C.G: There were no changes
Lazarou I [26]	Mild cognitive impairment amnesic, Female D.I.G: (n: 66), 65 years C.G: (n: 63), 67 years	Randomized controlled trial. 20 sessions. MMSE, MOCA RBMT, FAS, RAVLT, BDI, HDRS, EEP, FAST	D.I.G: International ballroom dance 60 min. C.G: without intervention 10 months.	D.I.G the study found significant intervention-time interaction in favor of dance Therapy 10 months	C.G: His score and performance decreased on all tests
Lee HJ, Kim S.Y [27]	Parkinson, 65 years D.I.G: (n:25) C.G: (n: 16)	Randomized crossover clinical trial. 16 sessions. UPDRS, PDQL, BBS, BDI.	D.I.G: Turo qi Dance 60 min C.G: without intervention 8 weeks.	D.I.G: the study found significant intervention-time interaction in favor of dance Therapy 8 weeks	C.G: There were no changes
López-Rodríguez, M.M [28]	Fibromyalgia D.I.G: (n: 29), 55 years C.G: (n: 30), 54 years	Experimental study with a control group. 24 sessions.	D.I.G: Aquatic Biodanza. 1 h.	D.I.G: the study found significant intervention-time	C.G: There were no changes

(*continued on next page*)

Table 1 (*continued*)

Reference	Description/diagnosis/ sex/age	Study design/number of sessions/evaluation program	Intervention	Results		
		PSQI, STAI, CES-D, EVA, McGill, FIQ.	C.G: Stretching exercises. 12 weeks.	interaction in favor of dance Therapy 12 weeks		
López-Rodríguez M.M [29]		Fibromyalgia, female, 55 years D.I.G: (n: 19) C.G: (n:20) FIQ, McGill, EVA, AP, BDI	Randomized controlled trial. 24 sessions.	D.I.G: Biodanza in swimming pool 1 h C.G: Stretching exercises. 12 weeks.	D.I.G: the study found significant intervention-time interaction in favor of dance Therapy 12 weeks FIQ, MPQ, VAS, AP, BDI	C.G: There were no changes
Marquez, D.X [30]	Cognitive impairment D.I.G: (n: 28) C.G: (n:28)	Randomized controlled trial. 32 sessions. UDS, TMT, Stroop Test, Logical memory I immediate and II delayed	D.I.G: Merengue, Cha Cha Cha, Bachata and Salsa 1 h C.G: Education for health. 16 weeks.	D.I.G: the study found significant interaction in favor of dance therapy in episodic memory	C.G: Non-significant episodic memory change	
Michels, K [11]	Parkinson D.I.G: (n: 9) C.G: (n:4)	Prospective, randomized and controlled study. 10 sessions - Hoehn and Yahr scale, UPDRS, MOCA, TUG, BBS, BDI, FSS, VAFS, PDQ-39	D.I.G: Tango 60 min C.G: without intervention 10 weeks.	D.I.G: the study found significant interaction in favor of dance therapy UPDRS	C.G: Non-significant changes	
Patterson, K.K [31]	Chronic stroke D.I.G: (n:20)	Randomized controlled trial. 20 sessions -MiniBESTest	D.I.G: Contemporary ballet, jazz, folk, and ballroom dancing 60 min. 10 weeks.	D.I.G: the study found significant intervention-time interaction in favor of dance Therapy 10 weeks		
Pinniger, R [32]	Psychological stress, anxiety and depression D.I.G: (n: 21) M.G: (n: 16) C.G: (n: 29)	Randomized controlled trial. 6 sessions - DASS, RSE, Life Satisfaction Scale and Mindfulness Awareness Scale	D.I.G: Argentinian tango 90 min M.G: Meditation C.G: without intervention 6 weeks.	D.I.G: the study found significant intervention-time interaction in favor of dance Therapy	M.G: the study found no significant intervention-time interaction	C.G: Non-significant changes
Solla P [33]	Parkinson D.I.G: (n:10) C.G: (n:10)	Single-blind, randomized controlled pilot trial. unspecified sessions. - UPDRS, 6MWT, BBS, TUG, FTSST, BST, SRT, PFS-16, BDI, SAS, MOCA	D.I.G: Sardinian folk dance 90 min. C.G: Normal daily activities 12 weeks.	D.I.G: the study found significant interaction in favor of dance therapy	C.G: Symptom condition significantly worsened	
Vankova, H [34]	Depression D.I.G: (n: 79), 83 years C.G: (n: 83), 62 years	Randomized controlled trial. 12 sessions. - GDS, TUG, Barthel index	D.I.G: Ballroom dancing 1 h C.G: Normal daily activities 3 months.	D.I.G: the study found significant intervention-time interaction in favor of dance Therapy 3 months	C.G: Depressive symptoms significantly worsened	
Ventura, M.I [35]	Parkinson D.I.G: (n:8), 71 years C.G: (n:7), 70 years	Randomized controlled trial. 10 sessions. -TUG, Gait Speed,	D.I.G: Ballet, jazz, Broadway-style dancing 125 min C.G: Normal daily	D.I.G: the study found significant interaction in favor of dance therapy	C.G: Positive changes in balance, but negative changes in gait speed	

(*continued on next page*)

Table 1 (*continued*)

Reference	Description/diagnosis/sex/age	Study design/number of sessions/evaluation program	Intervention	Results		
		Standing Balance Test, GDS, FES-I, PDQ-39	activities 10 weeks.			
Volpe, D [36]		Parkinson D.I.G: (n:12), 61 years P.G: (n: 12), 65 years	Single-blind randomized controlled trial. 24 sessions. - UPDRS, TUG, BBS, FOG-Q, PDQ-39	D.I.G: Irish dance 90 min P.G: Physiotherapy 6 months.	D.I.G: the study found significant interaction in favor of dance therapy	P.G: There were changes but not significant with respect to the dance group
Zhu, Y [37]	Mild cognitive impairment D.I.G: (n: 29), 50 years C.G: (n: 31), 85 years	Single-blind randomized controlled trial. 36 sessions - WMS-IV, MOCA, SDMT, Digit Extension Task Forward and Backward, GDS	D.I.G: Aerobic dance 35 min C.G: Normal daily activities 3 months.	D.I.G: the study found significant intervention-time interaction in favor of dance Therapy 3 months.	C.G: There were no significant changes	
Hackney, M.E [38]	Parkinson, 55 years D.I.G: (n:10) C.G: (n: 10)	non-randomized clinical trial unspecified sessions. - ABC, FES, EF, functional range, walking speed	D.I.G: Argentinian tango 40 min C.G: Exercise 13 weeks.	D.I.G: the study found significant interaction in favor of dance therapy	C.G: There were no significant changes	
Haboush, A [39]	Depression, male and female, 69 years D.I.G: (n:12) C.G: (n:12	Pilot study 8 sessions. - HDRS, GDS y SCL-90R	D.I.G: Ballroom dancing C.G: without intervention 45 min 8 weeks.	D.I.G: the study found no significant intervention-time interaction	C.G:There were no significant changes	

session, description of the initiation phase, central dance phase and closing phase, total duration of intervention, type of pathology in which it was applied, objective of the intervention, scales used, and results of the study. For each result mean and standard deviation values are reported.

3.4. Qualification of the quality of the items included

The quality of the included studies was assessed using the PEDro [18] scale in an independent and blinded manner (LTO and EDB). This scale evaluates random assignment, concealment of random assignment, similarity of an individual's baseline characteristics, blinding of participants, therapists, and evaluators, outcome data for at least 85% of participants for at least one primary outcome, intention-to-treat analysis, statistical comparisons between groups, point estimates and variability measurements. Studies with a score of 6 or more points were included.

3.5. Risk of bias in the included studies

The investigators independently assessed the risk of bias using the PEDro scale in RevMan, which was included within the Review Manager Software Version 5.4.1. Each of the 10 items is scored as present (1) or absent (0) and then a score of 10 is calculated with the higher number indicating better quality [19].

4. Results

4.1. Selection of studies

The initial search identified 2154 studies, of which 1712 were excluded because they did not meet the proposed inclusion criteria, such as language and population. A total of 442 duplicates were removed, leaving a total of 221 articles to be analyzed by title. Consequently, 151 articles were evaluated with the PEDro scale in full text, 70 of which finally met the eligibility criteria and were included in the systematic review. Figure 1 shows the PRISMA flow diagram of the studies in this review, and the Tables 1, 2, 3, 4, 5 shows the summary of studies.

It is worth noting that in the intervention, more specifically in the central phase, most of the types of dance were used, except for the Karatrantou K [48] protocol which combined it with calisthenics. Sousa, F.E [85] carried out dance intervention every 72 h and Tarrant, K [88] implemented 25-minute dance-only interventions.

5. Subchapter 1 (results)

5.1. Dance based therapy in neurological diseases

5.1.1. Comparison with no intervention

Twenty-two studies, of which 14 did not report involvement in the control or comparison group, showed that the pathologies present in the groups involved are: depression, fibromyalgia, dementia, schizophrenia, Parkinson's, cognitive deterioration, and cognitive deterioration with mild amnesia, stress and chronic stroke. These groups were comprised of 4–83 participants, with men and women included in each group. The period of dance therapy varied between 35 and 125 min with a duration of 4–125 weeks, taking into account the methodological process in its 3 phases: warm-up, dance, and cooling off. The types of dance used were rumba and waltz, belly dancing, ballroom dancing, aerobic dance, Greek dance, Turkish dance, biodance, tango, contemporary ballet, jazz and folk, Sardinian folklore dance, and Irish dance.

5.1.1.1. Parameters assessed. The parameters evaluated include level of depression, pain, and fatigue, cognitive function, autonomy and functionality, physical aptitude, motor function, qualification for Parkinson's,

Table 2. Summary of studies investigating dance-based therapy compared to other interventions in cardiovascular patients.

Cardiovascular System					
Aweto, H.A [40]	Hypertension, male and female D.I.G: (n:23), 44 years C.G: (n:15), 46 years	Randomized controlled trial 8 sessions Harvard Step Test, PAS, PAD, VO2 max, FCR, FCM	D.I.G: Dance movement therapy 50 min C.G: Healthy lifestyle education -4 weeks.	D.I.G: the study found significant intervention-time interaction in favor of dance Therapy 4 weeks	C.G: There were no changes
Belardinelli, R [41]	Chronic heart Failure, male and female D.I.G: (n:44), 60 years C.G: (n:42), 59 years	Randomized controlled trial. 24 sessions. PCPE and echocardiogram, brachial artery vasomotor function, MHFLQ	D.I.G: Vals 21 min C.G: Exercise 8 weeks.	D.I.G: the study found significant interaction in favor of dance therapy	C.G: There were no changes
Dogru-Huzmeli, E [42]	Chronic venous insufficiency, male and female, 38 years D.I.G: (n:20) C.G: (n: 20)	Randomized controlled trial. 15 sessions -VCSS, SF-36, RMI	D.I.G: Turkish folk dance 45 min C.G: without intervention 5 weeks.	D.I.G: the study found significant interaction in favor of dance therapy	C.G: There were no significant changes
Kaholokula, J.K [43]	Hypertension D.I.G: (n: 27) C.G: (n: 28)	Randomized controlled trial 24 sessions -B.P, 6MWT, SF-12	D.I.G: Hula dance 60 min C.G: without intervention 12 weeks.	D.I.G: the study found significant intervention-time interaction in favor of dance Therapy 12 weeks	C.G: There were changes in the B.P
Kaltsatou, A.C [44]	Chronic heart failure, 67 years D.I.G: (n: 18) F.E.G: (n: 16) C.G: (n: 17)	Randomized controlled trial unspecified sessions -STS, BBS, force test with dynamometer, SF-36, IMI, Borg scale	D.I.G: Greek dance 60 min C.G: Exercise 8 months.	D.I.G: the study found significant interaction in favor of dance therapy.	C.G: There were changes but not significant
Krampe, J [45]	Heart disease, male and female, 85 years D.I.G: (n:15) C.G: (n: 12)	Randomized controlled trial 18 sessions. Multi-directional range test. - Multi-directional range test	D.I.G: Aerobics, jazz and soft ballet and low impact 45 min C.G: Normal daily activities 6 weeks.	D.I.G: the study found significant intervention-time interaction in favor of dance Therapy 6 weeks	C.G: There were no changes
Maruf, F.A [46]	Hypertension D.I.G: (n:60), 50 years C.G: (n:60), 54 years	Randomized controlled trial. 36 sessions - SBP, DBP and B.P control rates	D.I.G: Aerobic dance 45 min C.G: Medicament 12 weeks.	D.I.G: the study found significant interaction in favor of dance therapy	C.G: Non-significant changes
Maruf, F.A [47]	Hypertension D.I.G: (n:60), 50 years C.G: (n:60), 54 years	Randomized controlled trial. 36 sessions. - Serum lipids (triglycerides, LDL-C, HDL-C, and TC), B.P, BMI, and waist circumference	D.I.G: Aerobic dance 45 min C.G: Medicament 12 weeks.	D.I.G: the study found significant intervention-time interaction in favor of dance Therapy 12 weeks	C.G: Significant reduction in B.P
Maruf, F.A [48]	Hypertension, male and female D.I.G: (n:30), 50 years C.G: (n: 33), 52 years	Randomized controlled trial. 36 sessions. - IMC, waist circumference, blood pressure (SBP, DBP)	D.I.G: Aerobic dance 45 min C.G: Medicament 12 weeks.	D.I.G: the study found significant intervention-time interaction in favor of dance Therapy 12 weeks	C.G: Reduction of SBP and DBP but not significant
Serrano-Guzmán M-A [49]	Pre hypertension and hypertension, female, 69 years D.I.G: (n: 35) C.G: (n: 32)	Randomized controlled trial 24 sessions - B.P, PSQI, European quality of life questionnaire, VAS	D.I.G: Ballet 50 min C.G: Normal daily activities and medication 8 weeks	D.I.G: the study found significant interaction in favor of dance therapy	C.G: Non-significant changes
Vordos, Z [50]	Chronic heart Failure D.I.G: (n:17), 72 years C.G: (n:16), 74 years	Randomized controlled trial. 36 sessions. -6MWT, isokinetic dynamometry, Myotest-Pro test	D.I.G: Traditional Greek dance 40–65 min C.G: None 12 weeks.	D.I.G: the study found significant intervention-time interaction in favor of dance Therapy 12 weeks	C.D: Non-significant changes
Braga-H.O [51]	Stable coronary disease, 60 years D.I.G: (n:15)	Longitudinal study with non-probability sampling 9 sessions. -H.R	D.I.G: Samba 50 min 3 weeks.	D.I.G: the study found significant interaction in favor of dance therapy	
Honglian, S [52]	Cardiovascular and cerebrovascular diseases,	Randomized controlled trial	D.I.G: Line dance 45 min		C.G: Non-significant change

(*continued on next page*)

Table 2 (*continued*)

	male and female, 63 years D.I.G: (n:30) C.G: (n:30)	30 sessions -SBP, DBP, pulse and quality of life (GQOL-74)	C.G: Medicament 10 weeks.	D.I.G: the study found significant interaction in favor of dance therapy
Sousa, F.E [53]	Hypertension, female, 64 years D.I.G: (n:10)	Randomized controlled trial. 24 sessions. B.P, H.R, Blood lactate and nitric oxide test	D.I.G: Brazilian folklore 60 min 24 weeks.	D.I.G: the study found significant interaction in favor of dance therapy

equilibrium; perceived stress; sleep quality; memory, self-esteem; and gait speed.

Finally, it was shown that the dance therapy generated significant results in the parameters mentioned, while in comparison with the control group not included, the results were not statistically significant and in some particular cases tended to worsen the results of the conditions of the participants in this group [20, 21, 22, 24, 25, 26, 27, 31, 31, 33, 34, 35, 37, 39].

5.1.2. Comparison with another intervention

Of the 22 articles included, 7 reported an additional therapy to dance therapy; the dance therapy was complemented by meditation, the exercise of everyday life, stretching exercises, health education, and physical therapy. There were six sessions over 6 weeks with their respective phases (warm-up, dance, and cooling off). The participants with diagnoses of psychological stress, anxiety, and depression were divided into 3 groups: 21 in the dance group, 16 in the meditation group, and 29 in the control group.

5.1.2.1. Parameters assessed. The parameters evaluated included level of depression, stress, anxiety, self-esteem, satisfaction with life, and attention.

A comparison of the results shows that the groups that only participated in dance therapy obtained significant changes versus those that underwent a different therapy, which didn't show significant changes, and/or whose symptoms and evaluations obtained an even more negative change [23, 28, 29, 30, 32, 36, 38].

5.2. Dance based therapy in cardiovascular diseases

5.2.1. Comparison with no intervention

Included are six articles that did not include comparative dance therapy, with diagnoses of chronic venuous insufficiency, hipertention, arthritis, heart disearse, early Alzheimer's, chronic heart failure, and stable coronary artery disease. The groups were comprised of from 10 to 38 participants including men and women. The period of dance therapy was between 40 and 60 min with a duration of 3–24 weeks and from 9 to 24 sessions. The types of dance employed were Turkish folklore dance, hula dance, aerobics, jazz and low-impact ballet, traditional Greek dance, samba, and Brazilian folkloric dance.

5.2.1.1. Parameters assessed. The parameters evaluated include deep vein thrombosis, quality and functionality of life, and blood pressure level. Measurements were made of speed and length of step, equilibrium, lower limb muscular strength, jumping ability, maximum oxygen uptake rate, heart rate, blood lactate levels, and nitric oxide.

The results showed significant changes with dance therapy, in terms of quality of life; reduction of pain, heart rate and blood pressure; and an improvement in functionality and strength compared to the control group which showed no significant changes.

5.2.2. Comparison with another intervention

In 8 articles used for comparison, the participants suffered from pathologies such as hypertension, pre hypertention, cardiovascular and cerebrovascular disease, and chronic venuous insufficiency. The comparison groups were assigned education strategies pertaining to healthy lifestyle, exercise and therapy with medications, and dance therapy. The types of dance employed were dance movement, waltz, Greak dance, aerobics, ballet, and line dance. The groups were comprised of 15–60 participants, both male and female. The therapy sessions ranged from 21 to 60 min for a period of 4–32 weeks, with an average of 8–36 sessions.

5.2.2.1. Parameters assessed. The parameters evaluated were blood pressure, heart rate, resting heart rate, maximum heart rate, maximum oxygen uptake, quality and functionality of life, and blood pressure level, brachial artery function, functional capacity, lower extremity strength, seric lipids, body mass index, and quality of life.

Of the results showing the most significant changes for the dance therapy group were variables in blood pressure, maximum oxygen uptake, and heart rate. Pain scores dropped considerably. In comparison

Table 3. Summary of studies investigating dance-based therapy compared to other interventions in musculoskeletal patients.

Osteomuscular System					
Baptista, A.S [54]	Fibromyalgia, female D.I.G: (n:40), 18 and 65 years C.G: (n:40), 49 years	Single-blind randomized controlled trial. 32 sessions. EVA	D.I.G: Belly dance 1 h C.G: without intervention 16 weeks	D.I.G: the study found significant intervention-time interaction in favor of dance Therapy 16 weeks	C.G: There were no changes
Casilda-López, J [55]	Obese postmenopausal women with knee osteoarthritis, female D.I.G: (n:17) C.G: (n: 17)	Randomized controlled trial. 24 sessions. - WOMAC, 6MWT, H.R, EVA	D.I.G: Water dance 45 min. C.G: Traditional water exercise 8 weeks.	D.I.G: the study found significant intervention-time interaction in favor of dance Therapy 8 weeks	C.G: Non-significant changes
Okafor, C [56]	Lumbago, male and female D.I.G: (n:15) C.G: (n:15)	Randomized controlled trial. 18 sessions. - VAS, the Roland Morris Disability Questionnaire and the Nottingham Health Profile Questionnaire	D.I.G: Aerobic dance 45 min C.G: Physiotherapy 6 weeks.	D.I.G: the study found significant interaction in favor of dance therapy	C.G: Highly significant changes in the variables VAS, the Roland Morris Disability Questionnaire and the Nottingham Health Profile Questionnaire

Table 4. Summary of studies investigating dance-based therapy compared to other interventions in people with other conditions.

Other Affections						
Allet, L [57]	Obesity, male and female D.I.G: (n:34), 46 years G.C: (n:33), 50 years	Single-blind, quasi-randomized controlled trial, 12 sessions and Quality of Life-Lite questionnaire	D.I.G: Unspecified 110 Minutes C.G: structured patient education program 60 min	D.I.G: the study found significant interaction in favor of dance therapy	C.G: There were no changes	
An, S.Y [58]	Urinary incontinence, female D.I.G: (n:12), 52 years C.G: (n:12), 51 years	Randomized controlled trial 24 sessions, PFMP evaluation	D.I.G: Belly dance 90 Minutes C.G: without intervention	D.I.G: the study found significant interaction in favor of dance therapy	C.G: There were no changes	
Boing L [59]	Breast cancer, female, 54 years D.I.G: (n:12) C.G: (n:11)	Pilot study with a non-randomized Study unspecified sessions. - Quality of Life (EORTC QLQ-BR23), Piper Fatigue Scale, BDI	D.I.G: belly dance 60 min C.G: without intervention 12 weeks.	D.I.G: the study found significant intervention-time interaction in favor of dance Therapy 12 weeks	C.G: There were no changes	
Gillett, P.A [60]	Overweight, female D.I.G: (n: 20), 35 years C.G: (n: 18), 58 years	Randomized controlled trial. unspecified sessions - CPET, blood chemistry, body composition, PAR, HRrest, muscular endurance, flexibility, exercise test	D.I.G: Aerobic dance 60 min C.G: Exercise 16 weeks.	D.I.G: the study found significant intervention-time interaction in favor of dance Therapy 16 weeks	C.G: There were no changes	
Janyacharoen T [61]	Menopause, female D.I.G: (n: 31) C.G: (n: 32)	Randomized controlled trial. 18 sessions -6MWT, pulmonary function test, thoracic expansion, H.R, B.P	D.I.G: Thai dance 60 min C.G: Health orientation 6 weeks.	D.I.G: the study found significant intervention-time interaction in favor of dance Therapy 6 weeks	C.G: There were no changes	
Karatrantou K [62]	Premenopause, female, 46 years D.I.G: (n = 18) S.C.G: (n = 18) C.G: (n = 18)	Randomized controlled trial. 36 sessions - ICC, BF, FM, FFM, B.P, FVC, FEV1	D.I.G: Aerobic dance 62–82 min C.G: Strength exercises 3 months.	D.I.G: The Study found significant intervention-time interaction in favor of dance Therapy 3 months	C.G: Significant changes in muscle strength	
López-Rodríguez, M.M [63]	Stress D.I.G: (n: 42), 22 years C.G: (n:53), 21 years	Randomized controlled trial. 4 sessions. PSQI, PSS, CES-D	D.I.G: Biodanza 90 min C.G: without intervention 4 weeks.	D.I.G: the study found significant interaction in favor of dance therapy	C.G: There were no changes	
Mosher, P.E [64]	Premenstrual stage D.I.G: (n:27), 19 years C.S.G: (n: 26), 20 years C.G: (n: 25), 19 years	Randomized controlled trial. 36 sessions - Treadmill exercise test, body composition, fat percentage, and blood samples	D.I.G: Aerobic dance 50 min C.S.G: Continuous step C.G: without intervention 12 weeks.	D.I.G: The Study found significant intervention-time interaction in favor of dance Therapy 12 weeks	C.S.G: Significant decrease in the percentage of body gauze	C.G: There were no changes
Okura, T [65]	Obesity D.I.G: (n: 33), 52 years D.G: (n:35), 49 years D.W.G: (n: 22), 51 years	Randomized controlled trial 42 sessions. - SBC, Leg extension strength and vo2 max. B.D, lipoproteins and fasting glucose	D.I.G: Aerobic dance 45 min D.G: Diet D.W.G: Diet and walking 14 weeks.	D.I.G: the study found significant interaction in favor of dance therapy	D.G: Non-significant changes	D.W.G: There were no changes

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Table 4 (*continued*)

Gallo-Villegas, J [66]	Metabolic syndrome D.I.G: (n:30),49 years C.G: (n:29), 52 years	Randomized controlled trial 36 sessions. - Maximum oxygen consumption (Bruce protocol), B.P, hemodynamic evaluation (MP150)	D.I.G: Continuous dance 60 min C.G: without intervention 12 weeks.	D.I.G: The Study found significant intervention-time interaction in favor of dance Therapy 12 weeks	C.G: There were no changes
Serrano-Guzmán, M-B [67]	Post menopause, female, 69 years D.I.G: (n:27) C.G: (n: 25)	Single-blind randomized clinical trial. 24 sessions. - TUG, OLS, YPAS, IFIS, SBP, DBP, BMI, SF-12	D.I.G: Spanish folk dance 50 min C.G: Self-care treatment 2 months.	D.I.G: The Study found significant intervention-time interaction in favor of dance Therapy 2 months	C.G: There were no changes

with the other therapies, the dance therapy showed no significant change in blood pressure [40, 41, 44, 46, 47, 48, 49, 52].

5.3. Dance therapy in musculoskeletal diseases

5.3.1. Comparison with no intervention

One of the articles focuses on participants with fibromyalgia. With 40 women in each group, the therapy lasted 1 h for 32 sessiones during a span of 16 weeks.

5.3.1.1. Parameters assessed. The parameter measured was pain, which resulted in a significan reduction in the group that participated in belly dance therapy in comparison with the control group, which showed no significant changes [54].

5.3.2. Comparison with another intervention

Two articles cited studies, each involving 17 participants, to compare dance therapy and aquatic exercise. The subjects observed were obese post menapause women with osteoarthritis of the knee. Twenty-four sessions were conducted with physical therapy in 8 weeks with 15 subjects, both male and female, with pathologies of mechanical lower back pain. There were 18 sessions in 6 weeks and both therapies lasted 45 min.

5.3.2.1. Parameters assessed. The parameters of medication included osteoarthritis level, pain, fatigue, heart rate functional capacity and health profile. The most significant changes were seen in the aquatic dance group in the level of osteoarthritis, functional capacity, heart rate, fatigue, and pain level in comparison with the exercise group which showed no significant changes. In the second article, the aerobic dance group, when compared to the physical therapy group, obtained significant changes pertaining to the same variables of pain and health profile [55, 56].

5.4. Dance therapy in other conditions

5.4.1. Comparison with no intervention

Four articles observed participants with urinary icontinence, breast cancer, and metabolic syndrome. The groups consisted of 11–30 subjects. The 25 to 36 dance therapy sessions of 50–90 min lasted 12 weeks. The types of dances employed were belly dance, arerobics, and continuous dance. The parameters evaluated were quality of life, functional capacity, level of physical activity, muscular strength, fatigue, depression, maximum consumption of oxygen, body composition, and blood pressure. The results showed significant changes in dance therapy groups with respect to the control groups [58, 59, 63, 66].

5.4.2. Comparison with another intervention

Seven articles compared therapies for participants with pathologies such as obesity; over weight, menopause; and pre and post menstrual stage. These therapies were carried out in a structured program of education, exercise, health guidance, strength exercises, diet, walking, and self-care treatment. They lasted from 45 to 60 min over a period of 8–16 weeks. The parameters considered included blood chemistry, body composition, resting heart rate, muscular endurance, flexibility, functional capacity, thoraxic expansion, heart rate, blood pressure, and body mass index. The results showed a greater effectiveness with the dance therapy, demonstrating significant changes with respect to the other therapies with which it was compared [57, 60, 61, 62, 64, 65, 67].

5.5. Dance therapy in patients without medical diagnosis

5.5.1. Comparison with no intervention

Fifteen articles looked at participants without any diagnosis who participated in Thai boxing dance, line dance, ballroom dance, comtemporary dance, zamba, Turkish folklore dance, Caribbean dance, salsa, step dance, traditional Thai dance, capoeria, and aerobic dance. The

Table 5. Summary of studies investigating dance-based therapy compared to other interventions in patients without pathology.

Without Pathology					
Areeudomwong, P [68]	None D.I.G: (n:39), 67 years C.G: (n:39), 66 years	Randomized controlled trial TUG, Romberg test, LST, back and leg flexibility, agility unspecified sessions. - TUG, Romberg test, LST, back and leg flexibility, agility	D.I.G: Thai boxing dance 50 min C.G: without intervention 12 weeks.	D.I.G: The Study found significant intervention-time interaction in favor of dance Therapy 12 weeks	C.G: There were no changes
Bennett, C.G [69]	Mobility limitations, male and female, 93 years D.I.G: (n:12) C.G: (n:11)	Randomized controlled trial. 16 sessions - BBS, lower limb dynamometry, SPPB, gait speed	D.I.G: Line dance 1 Hour C.G: without intervention 8 weeks.	D.I.G: The Study found significant intervention-time interaction in favor of dance Therapy 8 weeks	C.G: There were no changes
Borges, E.G [70]	None, male and female, 67 years D.I.G: (n:39) C.G: (n:36)	Randomized controlled trial. 96 sessions - GDLAM, Borg scale, stabilometer	D.I.G: Ballroom dancing 50 min C.G: Normal daily activities 8 months.	D.I.G: the study found significant interaction in favor of dance therapy	C.G: There were no changes
Coubard, O.A [71]	Quality of posture in older adults D.I.G: (n: 19), 59 years C.G: (n: 19), 54 years	Randomized controlled trial. 12 sessions. - Static posture - Techno-Concept platform	D.I.G: Contemporary dance 90 min C.G: without intervention 4 weeks.	D.I.G: The Study found significant intervention-time interaction in favor of dance Therapy 4 weeks	C.G: There were no changes
Donath, L [72]	None, 21 years D.I.G: (n: 15) C.G: (n: 14)	Randomized controlled trial. 16 sessions. WHO-QoL-BREF Questionnaire, 6MWT, stand-up and reach test, jump and reach test.	D.I.G: Zumba (salsa and aerobics) 60 min C.G: without intervention 8 weeks.	D.I.G: The Study found significant intervention-time interaction in favor of dance Therapy 8 weeks	C.G: There were no changes
Eyigor, S [73]	None D.I.G: (n: 19), 73 years C.G: (n: 18), 71 years	Randomized controlled trial. 24 sessions - 20m walk test, 6MWT, BBS, MOS, SF-36, GDS	D.I.G: Turkish folk dance 1 h C.G: without intervention 8 weeks.	D.I.G: the study found significant interaction in favor of dance therapy	C.G: There were no changes
Federici, A [74]	None D.I.G: (n:20), 62 years C.G: (n: 20), 63 years	Randomized controlled trial. 24 sessions - Tinetti, Romberg, TUG	D.I.G: Caribbean dance 60 min C.G: without intervention 3 months.	D.I.G: the study found significant interaction in favor of dance therapy	C.G: There were no changes
Granacher, U [75]	None, male and female D.I.G: (n:14), 63 years C.G: (n: 14), 82 years	Randomized controlled trial. 16 sessions - Static postural control, dynamic postural control, force platform jump power, Freiburg questionnaire, MMSE	D.I.G: Salsa 60 min C.G: without intervention 8 weeks.	D.I.G: the study found significant interaction in favor of dance therapy	C.G: There were no changes
Holmerová I [76]	None, male and female D.I.G: (n: 8), 81 years C.G: (n: 12), 82 years	Multicenter randomized controlled trial. 12 sessions. - SFT, SRT, Barthel index,	D.I.G: Ballroom dancing 75 min C.G: Daily activities 3 months.	D.I.G: The Study found significant intervention-time interaction in favor	C.G: There were no changes

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Table 5 (*continued*)

		Lawton scale, MMSE, standing test, 2 min step test, TUG, SRT		of dance Therapy 3 months		
Janyacharoen, T [77]		None D.I.G: (n:20), 64 years C.G: (n: 18), 66 years	Randomized controlled trial. 18 sessions -6MWT, FTSST, SRT	D.I.G: Thai dance 40 min C.G: Aerobic exercise 6 weeks.	D.I.G: The Study found significant intervention-time interaction in favor of dance Therapy 6 weeks	C.G: There were no changes
Joung, H.J [78]	None D.I.G: (n: 43), 70 years C.G: (n: 43), 71 years	Randomized controlled trial. 16 sessions - SFT, BBS, TUG, DGI, Walk Test 10, MMSE	D.I.G: Creative dance C.G: Stretching 90 min 8 weeks.	D.I.G: The Study found significant intervention-time interaction in favor of dance Therapy 8 weeks	C.G: push-up and sit-and-reach test scores for 30 s increased significantly	
La Torre, A [79]	None, female, 27 years D.I.G: (n:10)	non-randomized controlled trial. 1 session Incremental test on a treadmill	D.I.G: Step dance 50 min.	D.I.G: the study found significant interaction in favor of dance therapy		
Machacova K [80]	None, Female, 82 years D.I.G: (n: 27) C.G: (n: 25)	randomized controlled trial. 12 sessions. TUG, AVD, IADL, SRT, Push-up test, 2-min step test, Back scratch test, 8-foot timed test.	D.I.G: Ballroom dancing 1 h C.G: Normal daily activities. 3 months.	D.I.G: the study found no significant intervention-time interaction	C.G: Non-significant changes in the TUG test	
Noopud, P [81]	None D.I.G: (n:22), 67 years C.G: (n: 21), 68 years	Randomized controlled trial. 12 sessions. - TUG, BBS, BBS, SQT, Raise/Lower Test	D.I.G: Traditional Thai dance 60 min C.G: Normal daily activities 12 weeks.	D.I.G: The Study found significant intervention-time interaction in favor of dance Therapy 12 weeks	C.G: There were no changes	
Rodrigues-Krause, J [82]	None, female D.I.G: (n:10), 66 years S.G: (n: 10), 66 years W.G: (n:10), 64 years	Randomized controlled trial. 24 sessions - VO2 peak, TUG, HDL-C, LDL-C, glucose, insulin, CRP, ICC, VAT	D.I.G: Dance not specified 60 min S.G: Stretching W.G: Hike. 8 weeks.	D.I.G: the study found significant interaction in favor of dance therapy	S.G: Significant changes in HDL-C, LDL-C, glucose, insulin, CRP, IC-C, VAT	W.G: Significant changes in HDL-C, LDL-C, glucose, insulin, CRP, IC-C, VAT
Sofianidis, G [83]	None, male and female, 70 years D.I.G: (n: 12) P.G: (n:12) C.G: (n:12)	Randomized controlled trial. 24 sessions - 3D force plate, tandem test, single leg stance	D.I.G: Latin dance 60 min P.G: Pilates C.G: without intervention 12 weeks.	D.I.G: The Study found significant intervention-time interaction in favor of dance Therapy 12 weeks	P.G: Significant changes in the tandem test	C.G: There were no changes
Eason, J.M [84]	None, female, 18 and 64 years D.I.G: (n:30)	crossover exploratory clinical trial Unspecified sessions. - H.R, energy expenditure, RPE. Borg scale	D.I.G: Dance-based group fitness class, 1 h C.G: dance video game on the Xbox Kinect. 6 weeks.	D.I.G: the study found significant interaction in favor of dance therapy	C.G: Non-significant changes	
Leelapattana, P [85]	None, female, 66 years D.I.G: (n:19) C.G: (n:20)	double blind randomized controlled trial unspecified sessions. - 3m tandem run, SRT, TUG	D.I.G: Thai classical dance 10 min C.G: Exercise 12 weeks.	D.I.G: The Study found significant intervention-time interaction in favor of dance Therapy 12 weeks	C.G: Non-significant changes	

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Table 5 (*continued*)

Silva, F.F [86]	None, male, 18 years D.I.G: (n: 30)	Randomized controlled trial unspecified sessions. - H.R	D.I.G: Capoeira 3 min 3 weeks.	D.I.G: the study found significant interaction in favor of dance therapy
Forte, R [87]	None, male and female, 60 years D.I.G: (n:10)	Controlled clinical trial unspecified sessions. - O2 max, VE,H.R, blood lactate	D.I.G: Aerobic dance 46 min/2 times a week.	D.I.G: the study found significant interaction in favor of dance therapy
Tarrant, K [88]	None, female D.I.G: (n:9)	non-randomized controlled trial 120 sessions -H.R	D.I.G: Aerobic dance and high impact aerobic dance 40 min 10 months.	D.I.G: the study found significant interaction in favor of dance therapy

D.I.G: Dance intervention group; **C.G:** Control group; **F.E.G:** Formal exercise training group; **S.C.G:** Series Combined Training Group; **C.S.G:** Continuous step group; **D.G:** Diet group; **D.W.G:** Diet and walking group; **M.G:** Meditation group; **S.G:** Stretching group; **W.G:** Walking group; **P.G:** Pilates group; **P.G:** Physiotherapy group; **BDI:** Beck depression scale; **VAS:** Visual Analog Scale for Pain; **MMSE:** Mini-mental State Examination; **PBA:** Postural Balance Analysis; **GDLAM:** Latin American Group for Maturity protocol; **BW:** Body Weight; **BMI:** Body Mass Index; **ME:** Muscular Endurance; **CE:** Cardiorespiratory Endurance; **TUG:** Timed Up-and-Go Test; **BBS:** Berg Balance Scale; **FAB:** Frontal Bedside Assessment Battery; **MRT:** Mental rotation task; **AES:** Apathy Evaluation Scale; **SDS:** Self-Rating Depression Scale; **UPDRS:** Unified Parkinson's Disease Rating Scale; **3DGA:** Coda-3 System/ Three-Dimensional Gait Analysis; **HFCS:** High-Frequency Camera System; **6MWT:** 6-minute Walk Test; **STS:** Standing Test; **LST:** Lower-Extremity Strength Test; **GAF:** Global Assessment of Functioning Scale; **PANSS:** Positive and Negative Syndrome Scale; **Q-LES-Q-SF:** Quality of Life Enjoyment and Satisfaction Questionnaire; **MOCA:** Montreal Cognitive Assessment Scale; **RBMT:** Rivermead Behavioral Memory Test; **FAS:** Verbal Fluency Test; **RAVLT:** Neuropsychiatric Inventory/Rey Auditory Verbal Learning Test; **HDRS::** Hamilton Depression Rating Scale; **PSS:** Perceived Stress Scale; **FAST:** Functional Assessment Staging Tool for Dementia; **PDQL:** Parkinson's disease Quality of Life Questionnaire; **PSQI:** Pittsburgh Sleep Quality Index; **CES-D:** Center for Epidemiologic Studies Depression Scale; **STAI:** State-Trait Anxiety Inventory; **MPQ:** McGill Pain Questionnaire; **FIQ:** Fibromyalgia Impact Questionnaire; **UDSNB:** Uniform Data Set Neuropsychological Battery**;** **TMT**: Trails Making Test; **FSS:** Fatigue Severity Scale; **VAFS:** Visual Analog Fatigue Scale; **PDQ-39:** Parkinson's disease Questionnaire 39**;** **MiniBESTest:** Mini-Balance Evaluation Systems Test; **DASS:** Depression Anxiety and Stress Scale; **RSE:** Rosenberg Self-Esteem Scale; **FTSST:** Five Times Sit-and-Stand Test; **BST:** Back Scratch Test; **SRT:** Sit-and-Reach Test; **PFS-16:** Parkinson's Disease Fatigue Scale; **SAS:** Satarkstein Apathy Scale; **GDS:** Yesavage Geriatric Depression Scale; **FES-I:** Falls Efficacy Scale-International; **WMS-IV:** Wechsler Memory Scale-Fourth Edition; **SDMT:** Symbols Digit Modality Test; **FOG-Q:** Freezing of Gait Questionnaire modified; **ABC:** Activities-Specific Balance Confidence Scale; **FES:** Modified-Falling Efficacy Scale; **EF:** 17-item Philadelphia Geriatric Center Morale Scale; **SCL-90R:** Symptom Checklist-90-R; **SBP:** Systolic blood pressure; **DBP:** Diastolic blood pressure; **HRrest:** Resting heart rate; **MHR:** Maximum heart rate; **H.R:** Heart rate; **BADL:** Basic Activities of Daily Living; **IADL:** Instrumental Activities of Daily Living; **SFT:** Senior Fitness Test; **DGI:** Dynamic Gait Index; **TSST:** Try sitting and standing 5 times, **B.P:** Blood pressure; **CPET:** Cardiopulmonary Stress Test; **MHFLQ:** Minnesota Living with Heart Failure Questionnaire; **VCSS:** Venous Clinical Severity Scores; **SF-36:** Short Form Quality of Life and Functional Capacity; **RMI:** Rivermead Mobility Index; **SF-12:** 12-Item Short Form Health-Related Quality of Life; **OLS:** One Leg Stance Test; **YPAS:** Yale Physical Activity Survey; **IFIS:** International Fitness Scale; **WOMAC:** WOMAC Osteoarthritis Index; **ICC:** Waist and hip circumference index; **BF:** Body Fat Percentage; **FM:** Fat Mass; **FFM:** Fat-Free Mass; **FVC:** Forced Vital Capacity; **FEV1:** Forced Expiratory Volume in 1s; **SBC:** Segmental body composition; **SPPB:** Short Physical Performance Battery; **MOS:** Medical Outcomes Study; **VAT:** Visceral Adipose Tissue; **SQT:** Step quick turn test; **VO2:** Oxygen Consumption; **VE:** Pulmonary Ventilation;**;** **IMI:** rationalization inventory.

Table 6. Central phase/Dance type.

Intervention Frequency	Description
1 single intervention 22 studies	**Muay Thai dance program:** 30-minute duration, including specific patterns for the upper and lower extremities. While performing each pattern, participants stepped in a squared shape following a Muay Thai song. The dance was taught progressively and choreographed at a slow pace in weeks 1 and 2, and then it moved to a faster pace in weeks 3 and 4. Each Muay Thai pattern was performed 10 times [23]. **Dance Movement Therapy:** Participants danced to fast music for 15 min over two intervals [24]. **Line dance:** The dance routines varied between each class and movements were added at each session, which included leg and trunk movement, weight transfers, and postural control in the development of choreographies which varied walking forwards/backwards, side to side, spinning, pivoting, shuffling and kneeling [27], **Aquatic dance:** The intervention lasted 21 min; 5 min at slow pace, 3 min at fast pace, 5 min at slow pace, 3 min at fast pace, and 5 min at slow pace [11]. **Contemporary dance:** The session consisted of 45 min of improvisation and this was organized around four steps: 1. individual exploration, 2. exploration in pairs, 3. each duo or group presented their work which was developed in 1 and 2, and 4. solo improvisation and development of a movement to express one's own feelings [32]. **Zumba fitness:** 40 min of intervention with Zumba, consisting of steps forward, backwards and sideways, spinal rotations, combined with spinning and jumping. The song speed increased at two-week intervals [34]. **Salsa:** This consisted of basic steps; 3-step change of weight, and the simplest forwards, backwards, sideways, and rotational salsa movements [38]. **Creative dance:** 45 min with 15 min of resting, divided into phases. In the first stage, the instructor offered 5 basic concepts of movement: walking, running, bending, stretching, and shaking. Stage 2 involved a sequence of improvisation tasks with a theme proposed by the instructor, where the participants created a single dance combination piece together [44]. **Turo Qi dance:** 30-minute duration. The steps used were Qi flow 1-1: preparatory posture; 2-1: warming of the pulmonary meridian; 2-2: gallbladder meridian suppression (GB); 3-1: stimulation of the three yang meridians; 3-2: stimulation of GB34; 4-1: Qi flow through the triple energizer meridian (TE); 5-1,2: stimulation of the stomach meridian (ST); 6-1: stopping the yin meridians; G1: Perception of Qi in PC8 [52]. **Biodanza:** 40-minute duration. The dance session consisted of more active movements, such as walking, dancing, and exercise. The dance movements were based on natural movements, such as walking, jumping, and stretching. It used expressions involving "bonding rituals," such as shaking hands, hugging, or stroking, as well as archetypal gestures [53]. **Spanish folk dance:** This lasted for 30 min, and it was divided into 20 min of dance and 10 min of choreography. The movements used were laterality, spatial orientation, attention, adaptation to rhythm, coordination, and balance [70]. **Sardinian folk dance:** 50-minute duration. The dance consisted of two forms; the one-structure form, which uses slow rhythms, and the two-structure form, which uses fast rhythms. Participants held hands or arms to form a circle that rotated clockwise, which included steps and small jumps, with a stop on the right foot. During the dance, the knees were kept slightly bent to ensure an even jump of the forefoot [72]. **Irish dance:** They did a 70-minute dance class, 1 time a week and were provided with a video of the steps to be performed [75]. **Samba:** The dance phase lasted 40 min, which included 20 steps consisting of weight transfer, three-beat marking, walking, lateral and frontal movements, swinging, and others [82]. **Line dance:** The dance lasted 30 min and included a combination of various movements, such as a split kick, spin, cross step, toes on the floor, treadmill step, swing step, and body wave, with no high-frequency explosive movements [84]. **Brazilian folk dance:** 40-minute duration, which consisted of steps like jumps, spinning, squats, changes of direction, light races, footsteps, claps, and arms lifts [85]. The review process showed that the steps performed during interventions with dances, such as Caribbean dance, hula dance, step dance, Latin dances, fitness dance and capoeira were not specified [36, 45, 50, 71, 80, 86].
2 interventions	**Rumba, waltz:** The sequence consisted of 5 min of slow waltz, 3 min of fast waltz, 5 min slow, 3 min fast and 5 min slow, which came to a total of 21 min. The class was taught for patients with chronic heart failure [26]. The intervention that was used for patients with depression used waltz combined with rumba and, in those cases, the protocol started with 90 min of rumba. The first steps were the basic steps with combinations, such as a basic step with music. Participants danced in pairs and performed the flat-foot step ("paso llano"), carry step ("acarreo"), hammerlock step, and the opening out step. Finally, waltz was performed for 90 min. The sequences of steps was made according to a box step chart for the right foot, followed by a stepping exercise with music, dancing with a partner, and finally exercise with the steps and music [20]. **Turkish folk dance:** This program consisted of performing 10 programmed steps, in which participants combined neuromuscular and proprioceptive facilitation exercise patterns, diaphragmatic breathing exercises, and breathing retraining. The duration of the dance was not specified [33]. It also included semi-flexed movements of the knees, knee flexion moving the right and left foot, circular movements of the ankles, walking back and forth 3 times, and movements of the arms to the sides [35]. **Aquatic Biodanza:** Different types of basic creative dance and expression movements were performed, including moving the upper and lower limbs in accordance with the music, expressing emotions aroused by the melodies and by the interaction between them [54], with different movements, such as walking and slow movements of the upper and lower limbs [55].
3 interventions	**Traditional Greek dance:** This consisted of basic low-impact steps, performed by a single group holding hands in a semi-circle [46]. The second protocol included movements in a circle, starting with the right foot moving in an anticlockwise direction, and they were accompanied by traditional Greek music from different areas of Greece [47]. The last protocol did not specify the steps performed [76]. **Belly dance:** The first protocol used steps such as belly circle - bump - hip roll, belly roll, ripple, figure-eight of the rib cage, hip shake and choo choo-shimmy [22]. In the second protocol, the movements used in the upper limbs were the snake movement, trunk elevation, lateral movement, rounded movement, hip slide, lateral movement, rounded movement, pelvic camel, vibration, infinity, figure-eight Mayas up and down, and the Basic Egyptian. Displacements included forwards and backwards with shimmy, and lateral with shimmy and dabke. Finally, they did a figure-eight, angel wings, and the tray and cabin movements [25]. In the third, an order of technical evolution was followed: loosening of the hips; pendulums and side strokes; Egyptian ripples and rounds; basics and spinning; shimmies and variations; Dabke Arab folk dance, dance pitcher, tambourine dance, Khalije Arab folk dance, and the veiled dance [28].
4 interventions	**Tango:** In the first protocol, participants used the basic Tango step [41]. In the second protocol, they performed steps, such as standing on their tiptoes, lifting alternate legs, balancing on one leg, and exploring Tango movements [61]. In each session they focused on a different aspect of the dance; awareness of walking, awareness of one's own body and of the partner's, resistance and weight transfer, and close embrace [66]. In the last protocol, they worked on the basic principles of the Argentine Tango, such as association, synchronization, footwork, and quality of movement [79].

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Table 6 (*continued*)

Intervention Frequency	Description
	Aerobics along with jazz and ballet: The movements used were: spine roll up, swinging, step touch, jazz shoulders, hello, sitting Dolly, fever, Kansas City, and the sentimental trip [49]. In the second protocol, the steps were performed in a chair and/or as standing choreography to the song 'Love Me Tender.' Mirroring work in pairs was done to Comptine D'un Autre Été, dance skills in pairs were practiced to Blackbird, and finally to Always [65]. The steps were based on Spanish dance and ballet, and were choreographed to include weight changes, reaching the arms in all directions, lifting the legs and flexing the feet [69] and finally, the participants moved to the center of the dance floor, mirroring or moving around the dance floor for 20 min. (4) The movements were performed at least twice, with and without music [74]. **Thai dance:** Postures included raising/lowering/bending/stretching arms, raising the right and left arms alternately, raising and lowering the legs, stretching the knees, standing on the toes and flat feet, and turning around [42, 43, 63, 81].
9 interventions	**Ballroom dance:** This involved basic figures and combinations of ballroom dances, such as the Polka, Waltz, Foxtrot, Cha-cha-cha, and the Cancan. In addition, the participants became familiar with various international ballroom dances, such as Tango, Waltz, Viennese Waltz, Fox trot, Rumba, Cha-cha-cha, Swing, Salsa, Merengue and Disco - Hustle. All dances were first introduced with their special musical characteristics and their origin [29, 30, 40, 41, 51, 56, 57, 73, 83].
12 interventions	**Aerobic dance:** This type of dance was used most when implementing the protocols. It included instructions for postures, movements and stretching techniques, leg bounce movements, forward and backward movement, jumping, shoulder movements, arm stretches, trunk stretch, trunk, hip and chest rocking and bending, 10-inch bench interval training with alternate steps with equal periods of aerobic dance patterns, basic up and down steps, lunges, straddle steps, along with coordinated arm movements and knee bends, heel up, boxing, shoulder movement, kicks, square steps, rowing exercises, and balance exercises [31, 37, 48, 58, 59, 60, 62, 64, 77, 78, 87, 88].
Finally, 3 protocols were identified that did not specify the type of dance used [21, 39, 68].	

Our source.

sessions of 3–90 min of dance therapy lasted between 4 and 40 weeks. The parameters evaluated were equilibrium, strength of lower limbs, flexibility, fatigue, functional autonomy, posture, physical activity, quality of life, depression, cognitive function, oxygen consumption, and heart rate compared to the results of the control groups. There were no significant changes in the control group but in the dance therapy group for each of the categories [68, 69, 70, 71, 72, 73, 74, 75, 76, 79, 80, 81, 86, 87, 88].

5.5.2. Comparison with another intervention

Six articles compared dance therapy with aerobic exercise, stretching, walking, Pilates, dance videogames in the Xbox Kinect, and exercise. These therapies were implemented during intervals of 40–90 min for a period of 6–12 weeks. The parameters considered included functional capacity, lower body strength, flexibility, equilibrium, gait speed, VO2 max, and physical activity level. Taking into account that the participants had no health conditions, significant positive effects were achieved when employing the dance therapy for the general health of the subjects in comparison with the other therapies, in which no significant changes were shown [77, 78, 82, 83, 84, 85].

6. Characteristics of the protocols

The dance protocols in the included studies provide information on the duration of each session, ranging from 10 min [81] to 30 min [26], 35 min [77], 40 min [42], 45 min [88], 45 min [11, 33, 49, 58, 59, 60, 64, 78, 83], 46 min [87], 50 min [23, 24, 29, 30, 50, 62, 70, 82], 60 min [25, 27, 28, 31, 34, 35, 36, 37, 38, 39, 41, 43, 45, 46, 47, 51, 52, 54, 55, 56, 57, 61, 63, 65, 66, 67, 68, 69, 71, 73, 80, 84, 85], 65 min [76], 75 min [40, 74], 82 min [48], 90 min [22, 32, 47, 53, 72, 75] and 110 min [20, 21]. The protocols were conducted between 1 and 3 times per week, and lasted from 3 to 40 weeks. They also include a description of the following phases; the central phase is in Table 6:

6.1. Warming up

This lasts 10 min and involves joint movement and muscle group stretching in the central phase - dance duration ranged from 20 to 70 min.

6.2. Final or cooling down phase

The most chosen cooling down method used by the authors was stretching, specifically of the main muscle groups (biceps, triceps, rhomboids, trapezius, hamstrings, quadriceps, hip flexors, calves, the gluteus and hip adductors) [20, 23, 35, 37, 38, 39, 40, 42, 43, 44, 48, 55, 56, 58, 59, 60, 62, 73, 76, 78, 81, 84] Another percentage opted for sketches of experiences [21], joint mobility [22, 77], reports of experiences [66, 74], relaxation with low-intensity rhythms [30], comments at the end [49], dancing and slow breathing exercises [24]. Turo Qi dance, in particular, chose the cooling down method proposed by Turo Qi dance [52], which included a celebration at the end [53] walking and lying down [34], low-intensity exercise [45, 54], breathing and massage [32]. On the other hand, 33 protocols did not specify their type of cooling down [25, 26, 27, 28, 29, 31, 33, 36, 41, 46, 47, 50, 51, 57, 61, 63, 64, 65, 67, 68, 69, 70, 71, 72, 75, 79, 80, 82, 83, 85, 86, 87, 88].

7. Quality evaluation

The PEDro scale was used to assess the methodological quality and risk of bias of the included studies. The score ranged from 6 to 10, and was interpreted to have a moderate to good methodological quality. There was a low risk of bias score, and 2 of the 70 articles were excluded since they represented a risk for the blind estimation of the evaluators. Given its characteristics, this is a complete and effective quality assessment scale for the clinical trials evaluated [18], see Figures 2 and 3.

8. Discussion

This systematic review aims to explain the protocols of dance therapy adopted in the process of rehabilitation through a detailed report of the duration and types of dance required for each pathology showing, in turn, studies that promote physical qualities in healthy individuals. The protocols of the comparison groups that did not receive therapy indicated a significant interaction between the therapy and the duration of 4–40 weeks in favor of the dance therapy and the results of the comparison groups receiving other therapies such as

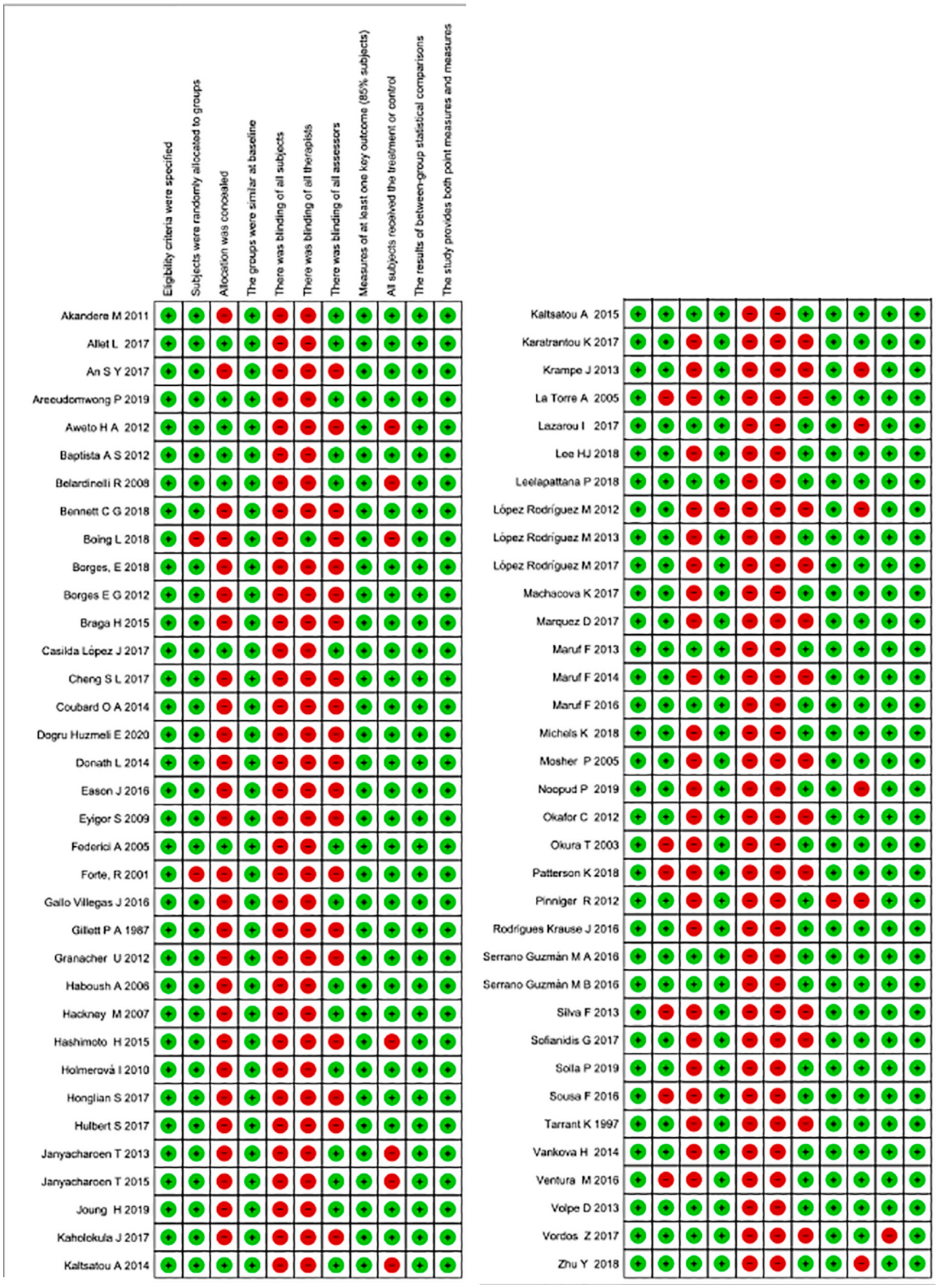

Figure 2. Assessment of evidence with the PEDro Scale. Source: Our own, created using Revman 5.3.

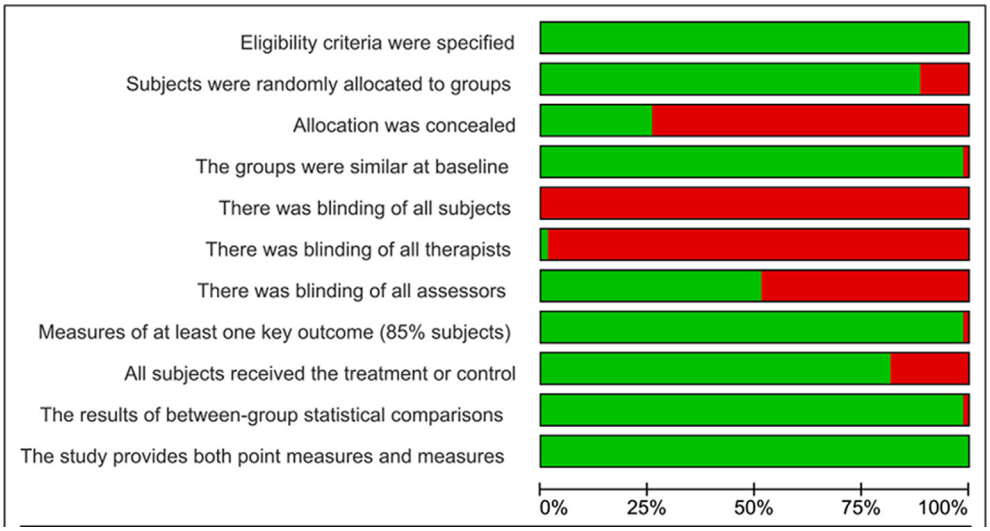

Figure 3. Summary of the risk of bias. Source: Our own, created using Revman 5.3.

exercise and education were similar. None of the articles reported adverse effects for the dance therapy group, which showed to be a safe procedure.

8.1. Dance therapy in neurological patients

It was shown that dance therapy offered significant effects in the 21 studies that included patients with neurological pathologies and it showed to be effective in comparison with interventions in the absence of another therapy. Our findings identify the impact on the reduction of symptoms of depression, offering an increase in quality of life, well-being, and cognitive and motor abilities. In patients with schizophrenia, the dance therapy provided the effects mentioned in a previous study obtaining similar data, thus, adding an improvement of the interpersonal relationships of these patients [89]. Employing dance therapy is more effective than the absence of therapy and is more effective than the other therapies, since it leads to improvement in the values of the Berg equilibrium scale. The UPDRS scale score was reduced by -2.52 points. The completion time of the functional mobility test with the TUG scale was significantly reduced, going from -1.15 s to - 0.27 s, allowing functional mobility to increase in the dance therapy group. In addition to mitigating these symptoms, gait speed and resistance evaluated by the 6MWT test improved favorably, but not significantly [90]. There was an increase in cognitive performance, improving the scores of the MMSE in the dementia patients receiving dance therapy compared with no intervention. One study showed improvement in 2 of the 7 participants in this measure and in quality of life significant changes were shown in the seven patients [91]. Another systematic review detected similar data that support significant changes in memory and cognition of these patients [92]. Additionally, after the dance therapy, the results of the improvement of motor symptoms and equilibrium in Parkinson's patients suggest significant changes which continued after completing the 12 weeks of therapy [93].

8.2. Dance therapy in cardiovascular patients

In general, the 14 studies available investigated the effectiveness of dance therapy on the cardiovascular parameters compared to the absence of therapy as well as a different therapy, signalling as a principle finding that the use of dance therapy reduces systolic and diastolic blood pressure to a significant degree in comparison with a rutine of conventional exercise. A systematic review found a significant interaction between the therapy and the duration, concluding that the studies in which the dance therapy group that participated in less than 12 weeks of intervention obtained a greater reduction in blood pressure [94] in comparison with the control group, showing a difference of 7.6–18.3 mmHg. A comparison with a review and metaanalysis confirmed the change in blood pressure obtained with dance therapy, showing a reduction of 12 mmHg in systolic blood pressure and 3 mmHg in diastolic blood pressure [95]. Similarly, the change and effects reflected on metabolic function, providing a reduction in the blood results, mainly in the lipidic profile, glicemia, and body composition, offering a decrease in cardiovascular risk factors that the majority of the patients had prior to the twelve-week therapy [96]. The results of the review lead to the conclusion that the implementation of dance therapy as a rehabilitation method in patients with cardiovascular conditions has a positive effect in the patients' cardiac and metabolic function. Future studies could be directed at compiling the results generated by using dance therapy for patients with these conditions.

8.3. Dance therapy in musculoskeletal patients

Three studies were found that showed that dance therapy produces a 4% reduction in pain, an improvement lasting 32 weeks. Pain is the most important symptom in fibromyalgia, a reduction of which led to significant improvement in physical function, as well as an increase in the distance covered in a test of gait speed, evidenced as well in patients with osteoarthritis. Reduction of body weight that is produced in this type of patient plays an important role, given that it prevents an increase in the pain index in the knee and lumbar collumn [97].

8.4. Dance therapy in patients with other conditions or without conditions

The changes and effects of dance therapy which were found in the included studies in patients with other types of pathologies provide psychological and physical benefits, as in the case of cancer patients, increasing their quality of life and their mental health [98]. The participants in the dance therapy group experienced a significant decrease in 30 of the 37 studies. In addition, they experienced a reduction in sleep difficulties and anxiety [99]. Finally, the results of the systematic review of the studies of subjects without health conditions also showed significant positive effects in equilibrium and resistance, corresponding to a previous

review in which these subjects obtained a 40 m-improvement in distance after six weeks of dance therapy [100]. They also experienced significant changes in flexibility, gait speed, body composition, and general health; however, further research is needed for a comparative analysis.

8.5. Limitations

It was identified that there are few papers that describe a complete protocol and include the warming up, central and cooling down phases, and that define the execution time and the description of these phases. Future clinical trials involving a dance protocol should clearly contemplate and define the times and characteristics of the intervention phases, and present the information explicitly and summarize it as much as possible, which would allow adoption of these protocols by other studies.

9. Conclusion

Dance is a simple, innovative, safe, and effective strategy when it comes to being used as an intervention and rehabilitation method in patients with various pathologies and comorbidities, especially those associated with alterations in mobility, balance, and strength. It is also possible to identify the benefits and positive impact on people whose disorder or disequilibrium is reflected in their mental-cognitive and social health, or linked to episodes of depression by extrinsic and intrinsic factors, as it favors self-esteem and social participation.

Declarations

Author contribution statement

María Fernanda Hincapie-Sanchez and Leidy Tatiana Ordoñez-Mora: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Edward David Buriticá-Marín:Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

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Data included in article/supplementary material/referenced in article.

Declaration of interests statement

The authors declare no conflict of interest.

Additional information

No additional information is available for this paper.

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