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Review

Dance and Music for Improving Health among Patients with Breast Cancer and Parkinson's Disease: A Narrative Review

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Abstract: Although a longer life may bring new opportunities for older people and society, advancing age is a leading risk factor for developing several chronic diseases, consequently limiting the health span. During the ageing process, changes in the activity of several endocrine glands may occur, leading to different clinical conditions. Being physically active becomes fundamental for healthy ageing. Despite regular physical activity being shown to have many health benefits, patients with cancer and neurodegenerative diseases remain physically inactive. Over the past two decades, there has been a major increase in arts engagement (e.g., dance and music) on health and well-being in both clinical and non-clinical contexts. Dance and music have been shown to induce positive effects on hormonal glands, patients' sociality, and self-confidence. Therefore, this review aims to highlight evidence regarding the effects of music and dance on hormonal responses and as preventive and compliance tools for heathy ageing in breast cancer and Parkinson's disease patients.

Keywords: healthy ageing; exercise; cancer; neurodegenerative diseases; hormones; breast cancer; Parkinson's disease

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1. Introduction

A demographic change has occurred due to the decline in fertility and increase in life expectancy [1,2]. Indeed, between 2015 and 2050, the number of people older than 60 years is expected to double approximately from 12% to 22%. In 2050, more than one out of five people will be 60 years or older [1]. Although a longer life may bring new opportunities for older people and society, advancing age is a leading risk factor for developing several chronic diseases (e.g., cardiovascular, cancer, diabetes, and neurodegenerative diseases), consequently limiting the health span [2]. This process is also accompanied by an increase in the incidence of physical and cognitive limitations, leading to several disabling indicators (e.g., increased risk of falls, co-morbidity) negatively affecting the healthcare system [2,3]. The ageing process is characterized by a progressive decline in the functionality of several body systems, such as musculoskeletal and endocrine systems. Changes in the activity of several endocrine glands may occur, leading to a variety of clinical conditions [4]. For instance, the decline in testosterone levels and thyroid hormone concentrations could lead to the onset of hypogonadism and hypothyroidism, respectively [4,5]. Normal thyroid function is important to guarantee the integrity of physiological processes essential for mobility [6]. Recent data report that free triiodothyronine (FT3)/free thyroxine (FT4) ratio may be considered an independent marker of frailty and survival in older adults [6,7]. Ageing also affects body composition, determining an excess of fat mass and sarcopenia, which, in turn, favors the development of metabolic and hormonal alterations [8].

Poor and/or unbalanced nutrition and lack of physical exercise in aged people make them more susceptible to contracting several illnesses at the same time. Hence, additional

years of life strictly depend on lifestyle habits (e.g., levels of physical activity (PA) and nutritional intake) as well as on biological (e.g., genetics, hormones) and psychological factors (e.g., self-efficacy) [3]. Physical activity refers to any bodily movement produced by skeletal muscles that result in energy expenditure above basal levels, while physical exercise is a planned and structured subcategory of PA [9]. Physical fitness, generally defined as the ability to carry out daily tasks satisfactorily without unjustified fatigue, is achieved or maintained over time due to the regular practice of physical exercise, representing a key aspect of health [9]. Both PA and physical exercise are widely recognized to have significant health benefits: the regular practice of PA plays a key role in primary and secondary prevention strategies of several chronic diseases as well as on mental health, premature mortality, quality of life and well-being [10–12]. Physical activity also brings benefits for sexual health, which is another important aspect that, together with an optimal physical fitness status, is linked to well-being and cognitive functions among older people [7,13]. As physical inactivity is one of the leading risk factors linked with global mortality, the World Health Organization developed specific guidelines for PA practice. Older adults should regularly achieve at least 150–300 min of moderate-intensity aerobic PA per week, or at least 75–150 min of vigorous-intensity aerobic PA, or an equivalent combination of both modalities. Moreover, functional balance exercises and muscle-strengthening activities involving all major muscle groups are suggested [14]. Therefore, prevention strategies to promote a healthy ageing process became relevant for public health [2].

Physical activity has been shown to have beneficial effects on the endocrine system and hormone production [15,16]. In particular, PA is widely known as a tool for prevention and adjuvant treatment on metabolic diseases, through its direct effect on adipose tissue, which is an important endocrine organ able to produce several hormones and factors, such as adipokines and pro-inflammatory cytokines, involved in the pathogenesis of metabolic, cardiovascular, and neurodegenerative diseases, as well as hypogonadism and cancers [17]. Aerobic exercise training is able to increase energy expenditure, reduce nutrition overload and improve body composition, as well as modify the profile of adipokines and myokines with paracrine and endocrine effects [18]. Indeed, endurance training, among dysfunctional white adipose tissue, exerts an anti-inflammatory effect, improves glucose metabolism, improves the insulin resistance state, and increases lipolysis [12]. Moreover, PA improves the adipocyte mitochondrial function, favoring the expression of brown adipocyte-specific genes involved in the browning process [19].

Despite strong evidence for the health benefits of PA among older adults, this population remains physically inactive, particularly those with chronic health conditions such as cancer and neurodegenerative diseases [20–22]. This negative evidence led to a worldwide public health priority, carrying out strategies to encourage PA practice among this population. The practice of any type of dance activity could be an attractive and potential type of PA to promote health-related benefits for healthy ageing [23,24]. Moreover, it could be useful to improve Quality of Life (QoL) in oncology and neurodegenerative patients [25,26]. A connection between some types of cancer (e.g., skin cancer, breast cancer) and Parkinson's disease (PD) has been reported. Indeed, the etiologies of both diseases are multifactorial: some mechanisms associated with PD, such as mitochondrial dysfunction and oxidative stress, can also be involved in cancer proliferation or cancer suppression [27]. Aerobic exercise such as dance may have positive effects on psychological and physiological function [24,28]. Therefore, the following paragraphs will highlight the effects of music and dance on hormonal responses, and as a supportive tool for cancer and neurodegenerative treatment, particularly focusing on breast cancer and PD.

2. Effects of Music and Dance on Endocrine System and in Age-Related Domains

Over the past two decades, there has been a major increase in arts engagement (e.g., dance and music) on health and well-being in both clinical and non-clinical contexts [29]. Listening to music has been shown to evoke different hormonal responses [15,16,30]. According to the homeostatic theory, proposed by Huron, listening to sad music induces

negative emotions and distress that affect the hypothalamic–pituitary–adrenal system and trigger an increase in prolactin, oxytocin, and stress (cortisol and adrenocorticotropic) hormones [31]. In particular, the homeostatic theory predicts an increase in prolactin levels in response to various stressors and an increase in oxytocin levels linked to its anxiolytic functions [31]. However, a recent study showed a different modulation of the hormonal response to sad music, based on listeners' levels of empathy [30]. Indeed, in the high empathy group, prolactin and oxytocin levels were significantly lower with sad music compared with no music. Therefore, the enjoyment of sad music is related to triggering of the dopaminergic system in subjects with a high level of empathy that engage empathically with the music and are being moved by it [30]. Jezova et al. (2013) showed that listening to unpleasant music during mental (Stroop test, mental arithmetic) and physical (handgrip exercise) tasks increases anxiety and reduces blood pressure and adrenocorticotropic hormone in healthy men [15]. Moreover, the concentrations of testosterone, oxytocin, vasopressin and aldosterone slightly increase in response to an increased anxiety. Therefore, listening to unpleasant music might both positively and negatively influence the perception of stress and the level of anxiety depending on the listeners, which might have functional consequences [15]. Moreover, different types of music stimuli lead to dissimilar hormonal responses. Indeed, in a group of 20 healthy volunteers, listening to waltz music (by J. Strauss) does not lead to hormonal changes, while listening to modern classic music (by H. W. Henze) leads to a decrease in prolactin values and listening to meditative music (by R. Shankar) leads to a decrease in plasma cortisol, noradrenaline, atrial natriuretic peptide and tissue plasminogen activator concentrations [16]. Music also regulates social hormones (i.e., steroid hormones and peptides), which activate brain areas closely associated with empathy and sociality, resulting in pro-social behaviors [32]. Thus, music may have enhanced human reproductive success [32]. A summary of the effects of music on the endocrine system is reported in Figure 1.

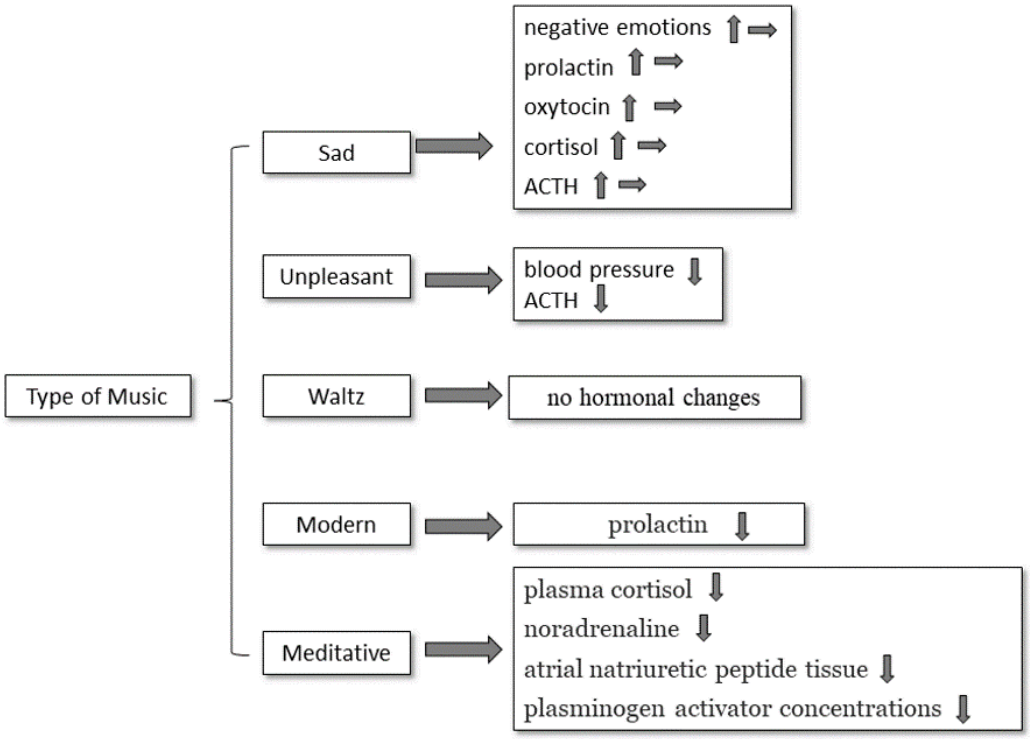

Figure 1. Summary of the effects of different types of music on hormonal responses.

One of the most common types of PA that combines body movements with music is dancing. Concerning dance training and hormonal responses, a combined exercise program led to beneficial effects on hormonal status in elderly women [33]. Indeed, after a combined

exercise program, which included yoga and Korean dance (60 min/day, 3 times/week, for 12 weeks), anterior dynamic balance, posterior dynamic balance, static balance, flexibility, muscle strength, grow hormone, dehydroepiandrosterone-sulfate, and estrogen significantly increased, thus improving the typical age-related hormone deficiency, with a positive impact on well-being and quality of life [33]. In another clinical study on healthy older adults, a 3-month dance movement training (DMT) program was compared with aerobic exercise training [34]. In these subjects, DMT significantly lowered the total concentration of cortisol released during the first hour after awakening (as measured by free cortisol and area under the curve for glucose) than aerobic exercise [34]. These results suggest that DMT improved cortisol regulation compared with aerobic exercise training (i.e., high-intensity activity performed on a recumbent bicycle). As suggested by the authors, this positive effect on cortisol secretion was obtained probably due to the use of music while performing the DMT [34]. Several studies showed that the practice of dance led to positive effects on physical performance, memory functions, anxiety and reaction time in elderly and middle-aged adults, respectively [35,36]. Vaccaro and colleagues showed that the practice of social dance (120 min/day, 4 times/week for 6 months) led to changes in body composition and physical performance (i.e., sit to stand and timed up and go tests), which are strongly correlated with the risk of falls in older adults [35]. Moreover, dance training enhanced the retrospective memory and lowered the trait anxiety levels. Therefore, social dance practice might act as a potential tool in different age-related domains (i.e., physical, cognitive and psychological) [35]. Bonavolontà and colleagues showed that the practice of standard dances (90 min/day, 3 times/week for 6 months) had a significant effect on reaction time, which is implicated in preventing cognitive impairments and the risk of falls [36]. Moreover, a faster reaction time was also maintained after 4 months, suggesting how dance benefits might be preserved over time [36]. This evidence suggests how the practice of a dance program may be applied as a successful ageing strategy to promote health-related benefits in older adults.

3. Dance as Preventive Tool in Cancer and Neurodegenerative Diseases

For the present narrative review, a literature search was conducted using two databases (PubMed and Scopus). The search was limited to peer-reviewed journals written in the English language and published in the last 3 years. Regarding Section 3.1, the keywords used included: dance, physical activity, ballroom, breast cancer, survivors. Regarding Section 3.2, the keywords used included: dance, physical activity, ballroom, Parkinson's disease, neurodegenerative diseases. Inclusion criteria consisted of studies regarding the effects of different types of dance protocol on quality of life in breast cancer or Parkinson's patients. Articles were excluded if they were not focused on functional parameters or quality of life. A manual search of the reference lists in the studies found in the computerized search was also conducted. Once the duplicates were removed, the total search yielded 9 studies for Section 3.1, and 10 studies for Section 3.2 that matched the above-mentioned criteria. These remarks will be helpful for all physical exercise specialists to create dancing protocols adapted to these types of patients. A summary of the reviewed studies is presented in Table 1.

3.1. Dance and Breast Cancer

As was reported above, PA and physical exercise performed during and after therapies produce several positive effects on fitness, fatigue, and sleep disturbance, improving the QoL of cancer patients, especially breast cancer (BC), as well as reducing recurrence and mortality [25,37,38]. Physical activity (e.g., dance, tai chi, Pilates) has been studied to understand their feasibility and the effect on prevention in cancer patients [28,39–41]. This section will summarize the latest evidence on dance protocol on QoL in breast cancer patients and survivors.

Considering that cancer patients are not regularly engaged in PA practice [21], Cerulli and colleagues developed a well-structured and adapted ballroom dance protocol and eval-

uated its effects on general well-being (functional and psychological parameters) in breast cancer survivors [42]. The well-tailored dance protocol seems to be particularly engaging, with high compliance, and it induces functional and psychological adaptations [43–45]. Due to the structured setting of workloads and the progression of the ballroom choreographies, the results seem comparable to moderate-intensity physical training. During the years, different dance modalities such as dance therapy, ballroom dance, circle dance, jazz and classical ballet have been investigated as unconventional PA in women with BC [46]. On the other hand, belly dancing is poorly studied, but it seems to increase several parameters related to cancer, as was reported by Carminatti et al. [47]. In the latter mentioned study, women during and after therapy were involved in a 12-week belly dancing protocol. The results showed significant changes in the improvement of body image, body stigma and transparency in the belly dance group after the intervention, whereas no differences were found in the control group. These data suggest that this type of dance has a positive effect on women's body image during and after therapies. The positive effects of belly dancing on BC may be comparable to Pilates practice, as reported by Boing et al. [40]. The authors showed that both a structured Pilates solo program and belly dancing classes, performed three times per week, for 16 weeks increased QoL by 2% in patients undergoing clinical treatments compared to the control group (i.e., usual care protocol). This positive effect may be due to the specific mental and physical concentration exercises, music listening, upper limb movements, re-discovering femininity, and social involvement performed during Pilates and belly dance practice. Similarly, the pilot study of Loo and colleagues analyzed the effect of a six-month group-based intervention of Polynesian Dance on QoL, as well as its feasibility to increase PA for sedentary breast cancer survivors [48]. Eleven women that completed chemo- and radiotherapy were involved, twice a week, in the Hula Dance protocol, which is a Polynesian dance form that contains dance movements of the whole body. The preliminary results of the study showed that a cultural dance program was feasible and increased the PA level of breast cancer survivors, improved QoL, and decreased levels of circulating cytokines (IGF-1, IGFBP3, IL-1B, IL-2, IL-4, IL-5, IL-10, GM-CSF, IFN-γ, and TNF-α) associated with obesity and inflammation. The effect of a traditional dance on breast cancer survivors was investigated in Greece by Sivvas et al. as well [49]. They enrolled 20 breast cancer patients in the active group and 10 patients in the control group; the results showed that the participation in a program of traditional Greek dance was higher and produced significant improvement in perceived fatigue than the control group [49]. Moreover, Tango is a dance training modality that is already well studied in breast cancer patients, showing both functional and psychological improvement [50]. Worthen-Chaudhari et al. for the first time evaluated satisfaction and postural control in survivors who practiced partnered Tango classes [51]. The results showed a high adherence and satisfaction in survivors enrolled with a companion than those enrolled alone. Moreover, the Adapted Argentine Tango proposed seems to improve postural control in breast cancer patients [51]. In the last year, Thieser et al. conducted one of the largest studies on the effect of ballroom dance on cancer survivors and their partners [52]. The sample size was very heterogenous, including more females (59.1%) than males (40.9%); 38 subjects were cancer patients (57.6%) and 28 were healthy dance partners (42.4%). The most common cancer diagnosed was BC, but the study included pancreatic cancer, lymphoma, melanoma, etc. According to their results, dancing seems to improve patients' functional capacity, self-efficacy, and lifestyle. To evaluate a well-tailored dance program in women in recovery from BC, a multi-site pilot study across five European countries was developed, with the financial support of the European Committee [28]. A standardized 32 h dance protocol, performed in 16 weeks, of Latin American dances was proposed in 5 different European countries, and a total sample size of 70 patients was enrolled. Data collected showed statistically significant changes in weight, right and left forearm circumference and hip circumference; an increase in 6 min walking test, right and left handgrip, sit-to-stand and sit-and-reach tests; and an improvement in the QoL summary score as well as the subscales of emotional and social functioning and symptoms.

Moreover, the results showed the feasibility and the reproducibility of this type of dance protocol for breast cancer survivors, and advocated collaborative efforts across countries to further research [28].

Hiansdt et al. investigated the effect of a 12-week mixed dance intervention on sleep quality in BC patients undergoing treatment [53]. The results showed that the intervention did not influence sleep quality or pain in these women; on the other hand, patients reported an improvement in well-being and social support. In addition, no adverse events were reported, and patients reported only positive feedback about acceptability and enjoyment of the dance intervention.

3.2. Dance and Parkinson's Disease

Regarding neurogenerative diseases, scientific evidence has been shown to have positive effects of being involved in PA on Alzheimer, Dementia, PD, and Multiple Sclerosis [26,54–60]. Dance protocols have been practiced in a wide variety of contexts related to neurological health promotion programs [61]. According to the American Dance Therapy Association, dance seems to be helpful for developmental, medical, social, physical, and psychological challenges [62]. In the field of neurodegenerative diseases, dance training has mainly been studied in the context of PD [63–65]. Therefore, this section will summarize the latest evidence on dance protocols on QoL in patients with PD.

Tango seems to be the style of dance that provides the most positive effects on PD-specific walking-related symptoms and balance [66]. Unfortunately, this activity may face some organizational challenges, such as difficulties for the teachers to work inside the clinical context, finding an adequate place for dancing, and scheduling an optimal time for the participants. To solve these problems, Albani et al. investigated the feasibility and the effect of a 5-week home-based Tango protocol on 10 patients with PD [67]. After the intervention, which included four sessions per week of home dance exercises, each one lasting one hour, and a weekly group session lasting two hours, the patients significantly improve their QoL, motor score on the Unified Parkinson's Disease Rating Scale (UPDRS) and kinematic performances. Therefore, Tango is feasible and effective even if it is performed at home. Among the different types of dances proposed in this population, the popularity of traditional forms of dance is increasing. Solla et al. evaluated the effects of Sardinian folk dance on functional and psychological parameters in patients with PD [68]. Patients enrolled in the dance group performed 12 weeks of activity, two sessions/week, 90 min/class; after the intervention, data showed positive effects on UPDRS, 6 min walking test, balance, and gait analysis parameters, as well as a decrease in depression and apathy. No improvement was found in the usual care group, suggesting that this type of folk dance may be considered a safe tool for contrasting impairments observed in PD [68]. As reported by the previous studies [67,68], dance may improve several parameters including balance. However, they did not consider the difference between stability in standing (static balance) and stability in motion (dynamic balance). To fill this gap, the study of McGill et al. aimed to determine whether weekly ballet classes may affect dynamic balance in a group of people with PD [69]. The 12-month ballet program, which included Seated Port de bras, Seated Tendu, Battement, Rond de Jambe and rhythmic exercises, did not produce any significant change in gait variability and balance confidence across time and between groups. These findings are in contrast with the previous ones [67,68], which suggest that dancing could improve balance and gait for this population. Therefore, further studies on ballet classes are needed to better understand this topic. Krishnamurthi et al. reported significant improvements in gait, posture, range of motion measures, gait stability, posture control, and flexibility after a Movement and Motion Dance-based training Program (MMDP) [70]. The MMDP was developed including specific movements and exercises able to improve several PD-related symptoms. To better understand the effect of dance on gait and balance, some studies compared different types of dance protocol with other activities, such as walking, running, or stretching [71,72]. Dos Santos Delabary et al. compared the effect of a 12-week Brazilian dance program, inspired by Samba and Forró rhythms, and

a 12-week walking program on spatiotemporal gait parameters in patients with PD [71]. The results showed similar results between two groups, except in the Self-Selected Speed parameter, in which the dance group reported an increase in stride frequency. Moreover, the fast speed analysis decreased after the dance protocol and increased after the walking activity, suggesting that this dance protocol is more effective in the improvement of fast speed in patients with PD. Following the same topic, Rawson et al. compared the effect of tango, treadmill and stretching programs on forward walking and motor severity in patients with PD [72]. The training lasted 12 weeks and was performed twice a week for 1 h. According to their results, and contrary to their hypothesis, forward and backward velocity improved in the treadmill group, and backward velocity and motor functioning improved in the stretching group. No significant differences were shown in the Tango group. Future research is needed to better understand these results and to examine the effect of combinations of exercises on PD-related symptoms. Studies reported so far mostly included patients with a diagnosis of mild to moderate PD, but it seems that dancing can be useful even in severe PD [73]. A case study evaluated the efficacy of Tango (the program was adapted according to the clinical status of the patient) in two patients affected by moderate and severe PD [73]. After 2 weeks, patients reported improvement in posture, balance and speed walking, suggesting that an adapted Tango protocol is very suitable for patients with neurological diseases and older subjects, even with severe symptoms. Moreover, this type of dance can be performed in a safe way, through movement at a slow speed, maintaining the range of motion of the single patient. Seeing the positive effects of dance in PD, Tunur et al. aimed to understand whether augmented reality devices, such as Google Glass, may be used to implement dance interventions to improve mobility and balance [74]. Seven patients were involved in three weeks of Moving Through Dance modules, using Google Glass. The adherence to the protocol was 95%, and the type of dance proposed was safe and accepted by the participants; the results showed an increase in mobility, while no differences were found in balance and QoL. However, despite this method seeming feasible and helpful, its efficacy should be investigated in a properly powered randomized controlled trial. While several protocols have been studied to increase motor symptoms in PD [56,67], research has yet to investigate the effects of interventions on body appreciation and appearance of these patients. Hadley et al. investigated the relationship between well-being and body appreciation in PD [75]. They also evaluated the effect of solo and partnered routines of a variety of styles (i.e., Bollywood, Tango, Irish dance) on well-being and body appreciation in 27 patients with PD and 14 controls. They found a significant positive correlation between perceived well-being and body appreciation, before the protocol, in patients, but not in the control. Moreover, their results showed an increase in well-being score after this dance protocol, suggesting that dance interventions should be recommended in PD to improve patients' body appreciation [75]. Fontanesi et al. investigated the effects of exercise training and dance with the same intensity on motor and non-motor symptoms, such as self-efficacy, in patients with PD [76]. Results showed a significant improvement in body self-efficacy, beauty subscale, symmetry of gait, and dual task performance after the dance protocol compared to the matched-intensity exercise training [76]. These results suggest that dance, through the beauty of movement, music, and interaction between teachers and participants, may remove the patient from a perception of disability, reclaiming a sense of efficacy and increasing several functional parameters. During the last year, the suspension of in-person physical activities programs due to the COVID-19 pandemic shifted the attention to online training even in PD [77]. An online survey explored the feasibility and the possible engagement with home-based dance programs in patients with PD, as well as potential benefits [78]. Results suggest that a home online supervised dance protocol seems accessible and usable for people with PD, and that some of the previously reported benefits of dance may be replicated in this context. Further studies are needed to confirm these data and increase the engagement of these patients in tailored dance protocols. An overview with the primary findings of the reviewed studies on the effects of dance on breast cancer and PD can be found in Table 1.

Table 1. Reviewed studies on the effects of dance on breast cancer and Parkinson's disease.

Breast Cancer Disease			
Study	**Study Design and Participants**	**Type of Dance**	**Primary Findings**
Carminatti et al., 2019 [47]	NRCT n = 19 BC undergoing treatments (54.55 ± 8.29 years) *Groups:* DG (n = 11) CG (n = 8)	12 weeks of Belly Dance—2 days/week	↑ Body Image, Body stigma, Transparency scale in DG; No change in self-esteem in pre–post DG
Cerulli et al., 2019 [42]	NR n = 14 BC post treatment (48.3 ± 5.2 years)	4 months of Latin American Dance—2 days/week	↑ Strength, Functional Capacity, Quality of Life in pre–post dance group
Boing et al., 2020 [40]	RCT n = 27 BC undergoing treatments (18–70 years) *Groups:* DG (n = 19) PG (n = 19) CG (n = 19)	6 weeks of Pilates solo or Belly Dance—3 days/week	↑ Quality of life in pre–post DG and PG
Loo et al., 2019 [48]	PS n = 11 BC post treatment (mean age 63 years)	6 months of group-based Hula Dance—2 days/week	↑ Vigor/Activity ↓ Waist circumference in pre–post dance group
Sivvas et al., 2020 [49]	NR n = 30 BC post treatment (48–59 years) *Groups:* DG (n = 20) CG (n = 10)	3 months of Greek traditional dances—3 days/week	↑ Self-care, Mobility, usual activity in pre–post DG ↓ Pain/Discomfort, Anxiety/Depression in pre–post DG
Worthen-Chaudhari et al., 2019 [51]	PS n = 22 C–including BC (60.8 ± 9.2 years) *Groups:* SDG (n = 13) CDG (n = 9)	8 weeks of Adapted Tango with or without partner—2 days/week	↑ Attendance in CDG vs. SDG ↑ medial-lateral sway, ellipse area, medial-lateral velocity in pre–post CDG and pre–post SDG
Thieser et al., 2021 [52]	NR n = 38 C– including BC n = 28 partners (40–80 years)	12 months of Standard and Latin Dance—1 day/week	↑ Self-efficacy and Active Lifestyle pre–post dance group No effect on fatigue and body image
Karkou et al., 2021 [28]	PS n = 54 BC post treatment (53.51 ± 7.99 years)	4 months of Latin American Dance—2 days/week	↓ Weight, forearm and hip circumference ↑ Functional Capacity, Strength, Flexibility and Quality of Life
Hiansdt et al., 2021 [53]	PS-NRCT n = 22 BC post treatment (55.2 ± 8.3 years) *Groups:* DG (n = 11) CG (n = 10)	12 weeks of Mixed Dances (Samba and Forró, Latin rhythms, Zumba, and hip hop)—2 days/week	↑ Well-being and Social Support in pre–post DG No change in Sleep Quality and Pain

Table 1. *Cont.*

Parkinson's Disease			
Study	**Study Design and Participants**	**Type of Dance**	**Primary Findings**
Albani et al., 2019 [67]	PS 10 PD (63.1 ± 9.25 years)	5 weeks home-based Tango protocol	↑ Quality of Life, UPDRS Motor Score and Kinematic Performances pre–post Tango
Solla et al., 2019 [68]	PS-RCT 20 PD (67.4 ± 6.1 yrs) *Groups:* DG (n = 10) CG (n = 10)	12 weeks of Sardinian folk dance—2 days/week	↑ UPDRS score, Functional Capacity, Strength, Balance, Gait analysis parameters in pre–post DG ↓ Depression and Apathy in pre–post DG
McGill et al., 2019 [69]	NRCT 32 PD *Groups:* DG (n = 29–69.8 ± 4.5 years) CG (n = 13–73.2 ± 8.1 years)	12 months of Ballet Classes—1 day/week	No effect on Gait Variability and Balance
Krishnamurthi et al., 2020 [70]	NR 19 PD (66.7 ± 7.2 years)	10 weeks of Movement and Motion training—2 days/week	↑ Gait Velocity, Stride Length, Stance Duration and Turning in pre–post training ↓ Time taken to initiate movement shifts in pre–post training
Dos Santos Delabary et al., 2020 [71]	NRCT 18 PD (≥50 years) *Groups:* DG (n = 12–68.6 ± 6.7 years) WG (n = 6–64.2 ± 4.9 years)	12 weeks Samba and Forró Brazilian dance and walking program—2 days/week	Functional mobility improved pre–post training similarly in both groups
Rawson et al., 2019 [72]	PCT 98 PD (67.2 ± 8.9 years) *Groups:* DG (n = 39) TG (n = 32) SG (n = 27)	12 weeks of Tango, Treadmill and Stretching training—2 days/week	↑ Forward velocity and backward velocity in pre–post TG ↑ Backward velocity and motor functioning in pre–post ST No change in pre–post DG
Koh et al., 2020 [73]	CR 2 PD (76 and 79 years)	2 weeks of Argentine Tango—10 h	↑ UPDRS, Posture, Balance and Speed Walking
Tunur et al., 2020 [74]	PS 14 PD (69 ± 5.5 years)	3 weeks of Home-based Dance using Google	↑ Mobility with a cognitive load in pre–post dance group; no changes in balance, quality of life and mood
Hadley et al., 2020 [75]	PS 27 PD (69.04 ± 8.56 years) 14 Partners (68.57 ± 8.72 years)	Solo and partnered routines of a variety of styles	↑ Well-being in pre–post dance group
Fontanesi et al., 2021 [76]	RM 7 PD (71.4 ± 6.7 years)	Dance for Parkinson's class, and matched-intensity exercise session	↑ Electrodermal activity, body self-efficacy, beauty subscale, symmetry of gait, and dual task performance in pre–post dance group

Abbreviations: DG, Dance Group; CG, control group; SDG, Solo Dance Group; CDG, Companion Dance Group; PG, Pilates Group; WG, Walking Group; TG, Treadmill Group; SG, Stretching Group; BC, Breast Cancer patients; C, Cancer patients; PD, Parkinson Disease patients; UPDRS, Unified Parkinson's Disease Rating Scale; NRCT, Non-Randomized Control Trial; RCT, Randomized Control Trial; PCT, Prospective Controlled Trial; NR, Not Reported; PS, Pilot Study; CR, Case Report; RM, Repeated Measure; MMDP, Movement and Motion Dance-based training Program; ↑, increase; ↓, decrease.

4. Conclusions

A longer life may be a risk factor for developing several chronic diseases and, therefore, being physically active is fundamental for successful ageing. However, patients with cancer and/or neurodegenerative diseases do not match the PA guidelines. Dance may be an easy, well-tolerated, and pleasant activity that could be used to increase the amount of PA during the lifespan. Dance and music have been shown to influence the hypothalamic–pituitary–adrenal axis. Moreover, dance may be used to better accept and reconnect patients with their bodies, increasing their self-confidence and self-expression, and to strengthen their personal resources, leading to an improved QoL. These positive effects depend on the type of music, dance and PA protocol proposed. We are aware of some limitations of our study. First, the review is not focused on all cancer and neurodegenerative diseases. Second, we focused on the use of music and dance as a supportive tool for breast cancer and PD treatment without considering their preventive effects on these two diseases. Future studies are needed to deeply clarify the hormonal responses during dance practice in cancer and Parkinson's patients and to assess the long-term effects of dance during the lifespan in healthy populations.

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