1-13-2019

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Disability and Rehabilitation, Vol. 42, No. 8 (January 13 2019): 1115-1121. DOI.

Ballroom Dance for Persons with Multiple Sclerosis: a Pilot Feasibility Study

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Abstract

Purpose: The purpose of this study was to evaluate the exercise intensity and feasibility of recreational ballroom dance for persons with multiple sclerosis (MS).

Methods: Seven persons with MS participated in 2 one-hour dance sessions per week for 6 weeks. Dance types included rumba, foxtrot, waltz, and push-pull. Six other persons with MS comprised a control group that did not dance. Heart rate and ratings of perceived exertion (RPE) were monitored during the sessions. Outcomes included: quality of life, fatigue, depression, self-efficacy, timed up and go, Berg Balance Scale, Dynamic Gait Index and the Multiple Sclerosis Functional Composite comprising 9-hole peg test, 25-ft walk test, and Paced Auditory Serial Addition Test (PASAT), a cognitive test.

Results: Heart rates and RPE indicated that ballroom dance for persons with MS can provide a light to moderate exercise intensity. After the dance program, quality of life and PASAT improved as did the MS Functional Composite Score. No changes were noted in the control group.

Conclusions: Recreational ballroom dance is feasible and can provide an exercise stimulus sufficient to help meet exercise recommendations for persons with multiple sclerosis as well as improve quality of life and cognition in persons with MS.

- **Implications for rehabilitation**
- Exercise or physical activity is important for the health and wellness of persons with multiple sclerosis.
- Persons with multiple sclerosis often seek information about non-traditional low-impact physical activity.
- In a small controlled sample, partnered recreational ballroom or social dance for persons with multiple sclerosis has been shown to be feasible and of recommended exercise intensity.
- Further, partnered recreational ballroom dance for persons with multiple sclerosis can improve measures of quality of life and cognitive function.

Keywords:

Social dance, exercise, physical activity, dance therapy

Introduction

Multiple sclerosis (MS) is a neurologic degenerative disease of the central nervous system, of autoimmune origin [1]. Common symptoms of persons with MS include fatigue, depression, cognitive difficulties, and motor impairments, including balance, coordination, and gait [2]. All of these factors can negatively affect quality of life [2,3].

One of the more promising non-pharmacological interventions for persons with MS is exercise or physical activity [2,4,5]. Exercise can help to decrease health risk from other diseases and is an important part of health and wellness for persons with MS, as it is for the general population. Exercise is important to maintain or improve walking ability [2] and may counteract symptoms common in MS including fatigue, depression, or mood [2,4,6] and thus have rehabilitation and other therapeutic value. Evidence is also emerging that exercise may help maintain or improve cognition and that there may be other neuroprotective effects as well [2,7]. The importance of exercise for persons with MS is further highlighted by findings of decreased physical activity in persons with MS compared to age- and gender-matched persons without MS [8–10]. Despite the importance of exercise, persons with MS report lack of information on exercise [11].

While there is no single gold standard for exercise per se, guidelines exist for the general population as well as for persons with MS to help meet recommended amounts or volume of exercise [12,13]. Guidelines as opposed to specific recommendations are particularly important because traditional exercise may have to be modified based on a person's disability status and non-traditional lower impact or recreational physical activities with documented benefits such as yoga [14] and tai chi [15,16] are popular with persons with MS.

Social dancing with a partner or recreational ballroom dance is a physical activity that has been studied in persons with Parkinson's disease [17,18] or other chronic conditions [19–22], as well as in persons with cardiovascular diseases [19] and mental illness [20]. In all cases, dance was found to be safe, fun, and effective in improving cardiovascular health, as well as emotional and physical function.

A benefit of partnered dance is that it is possible for one person to provide support for another, and if necessary, to aid in balance or prevent falling. Additionally, ballroom dance provides a unique movement experience in which participants must remember step patterns that are initiated in multiple directions. Dance can also provide for activity in a social setting and is something that could be done with one's spouse or significant other. Surprisingly, partnered ballroom-type dance has not been widely investigated as an exercise option for persons with MS. Nevertheless, a small non-controlled study of salsa dance in persons with MS did show benefit [23]. If ballroom dance were to be shown to be safe and elicit an exercise stimulus, then it could be a further non-traditional exercise option that could positively impact the lives of persons with MS. If intensity and duration of dance activity were appropriate to current exercise recommendations [13], then one might expect benefits expected with exercise. Even with a less than optimal exercise stimulus, ballroom dance might still impact other physical functions such as balance, gait, or emotional health resulting in enhanced wellness or quality of life [24]. Accordingly, the primary purpose of our investigation was to establish the feasibility and describe the exercise intensity of a recreational ballroom dance program for persons with MS. A secondary aim was to investigate whether ballroom dance would improve physical and psychological/emotional function in persons with MS.

Methods

Subjects

Persons with MS were recruited with the aid of the National Multiple Sclerosis Society – Wisconsin Chapter. A diagnosis of MS was confirmed from neurologic medical records. Inclusion criteria included

the ability to stand for 2 min or ambulate for 25 feet, and no exacerbations within the last three months. Exclusions included other immunological, metabolic, or cardiovascular diseases, change in disease or health status, or any other condition that could confound results. Clinical status was indicated by the Patient Determined Disease Steps, [25], which has been validated against the Expanded Disability Status Scale [25]. Persons who wished to take part in the dance but were not able to because of scheduling conflicts or other time commitments were recruited into a no-dance MS control group. Thus, the control group was not randomized but did also consist of persons with MS who wanted to take part in the dance. This control group went through all procedures, including post-testing after 6 weeks, but did not take part in the dance program. The control group was offered a series of ballroom dance workshops after post-testing that was optional and not part of the research. All subjects provided signed informed consent approved by the Marquette University Institutional Review Board.

Ballroom dance program

Dance sessions occurred during summer and early fall. Compliance was defined as completing 6 of the 8 weeks the program was offered. This leeway in attendance was given to account for vacations and other commitments. Dance sessions consisted of teaching several social ballroom dances including rumba, foxtrot, waltz, and push-pull, the latter a simpler variation of the hustle and similar to some swing dance styles [26]. Individual dances varied from 3 to 6 min.

The rumba traces a box pattern with the feet moving the body forward, sideways, and backward. Typically, it follows slower music where the counts are in 4/4 time. Steps can also be counted as slow, quick, quick.

The foxtrot in contrast to the other dances taught results in forward travel around a room as opposed to tracing a box, with feet moving the body forward and sideways. The foxtrot is also danced to music in 4/4 time typically at faster tempos than rumba but slower than push-pull. Foxtrot steps can also be counted as slow, slow, quick, quick.

The waltz can also follow a box pattern like the Rumba but follows 3/4 musical timing with a step on each beat or count. Although the waltz can progress, we primarily used the basic box pattern danced in place. For our purposes, we used slower tempos, though waltz music can be quite fast.

The push-pull is a simplified variation of the hustle and is similar to single-count or 4-step swing. This dance follows faster 4/4 beat music with a step on each beat or count. This dance starts with a backward then forward “rock step” followed with a march in place with each foot. While turns and rotations were introduced, this dance was danced primarily “in place.”

For all dances, men and women faced each other and followed the same movement patterns except that the women’s movements were mirror images of the men’s. Thus, for the foxtrot, women were moving backward, which presented a gait and balance challenge for some of our participants.

The dance frame refers in part as to how partners hold onto one another. The traditional frame for the rumba, foxtrot, waltz requires the man (or leader of either gender) to place his right hand on his partner’s left shoulder blade and to hold her right hand with his left out to the left side. The woman (or follower of either gender) places her left hand just below the man’s left deltoid muscle while holding

his left hand with her right. Thus, there is hand to hand and hand to trunk contact between partners. For the push-pull, the male holds the hands of the woman at about the level of her center of gravity or navel. This frame allows for arm extension and for the man to signal when he is stepping back away from the woman, so she can step back as well. A modified frame was used in instances where subjects required more stability from their partner. This is where the partner would hold onto the underneath of the upper arms of the subject, allowing the subject to lean more weight into the partner, while still maintaining a dance-like hold to complete the dance steps.

For all dances, basic steps were taught and reviewed each week to aid retention. Variations were also taught in a graded manner and to facilitate learning some dance patterns and variations were "choreographed." However, participants were encouraged to use whatever steps they wanted to without choreography. Thus, ballroom dancing provided participants with the opportunity to initiate stepping in multiple directions, learn and recall complex motor patterns, and process multiple sensory stimuli from proprioceptors, tactile senses, vision, and the vestibular system.

Each one-hour session required participants to stand or dance for approximately 80% of the time, though participants were encouraged to sit or otherwise rest as needed. Dance sessions were held twice a week for eight weeks and participation was monitored. Because people with MS are often heat intolerant, the room was air-conditioned with additional floor fans and water was provided.

Dance instruction and practice were progressed with respect to more complex movement patterns, increased tempo of music, or duration of movement without rest. Participants were encouraged to attend with a partner, but partners were available from the research team or other volunteers from the community if needed. All participants with MS danced with persons without MS although two persons with MS dancing together were not precluded per se. Within one week before and after the six-week dance intervention the questionnaire and functional outcome measures described below were obtained.

Questionnaires

The Patient-Reported Outcomes Measurement Information System – Global Health (PROMIS-GH) status was used as an indication of health-related quality of life [27], where a higher score represents better quality of life. Symptomatic fatigue was measured with the Fatigue Impact Scale [28] where higher scores represent worse fatigue. Depression was indicated by the Beck Depression Inventory [29] where higher scores indicated worse depressive symptoms. Because of the importance of self-efficacy in improving physical activity behavior in persons with MS [30], self-efficacy was measured with the Multiple Sclerosis Self-Efficacy Scale [31] comprising Function and Control subscales where higher scores represent greater self-efficacy.

Clinical/functional outcome measures

The MS Functional Composite Measure was obtained for each subject [32]. This weighted composite measure of function consists of a timed 25-ft walk test, 9-hole peg test (9-HPT), and 3-s Paced Auditory Serial Addition Test (PASAT). The MS Functional Composite Measure expressed as a Z-score compared to baseline can be used to indicate change in MS functional status [32]. In addition, MS Functional Composite Measure tests were analyzed individually as separate dependent variables whereas the timed 25-ft walk test can indicate ambulatory ability, the 9-HPT can indicate upper extremity function,

and the PASAT is a cognitive task assessing in part, information processing speed and working memory [32].

The Berg Balance Scale was used to indicate static balance [33,34], and the Dynamic Gait Index was obtained to indication dynamic balance [33,34]. The timed up and go were also administered as an indication of mobility and balance [35]. Because there can be an element of subjectivity in the balance tests, a physical therapist (SB) blinded to the intervention or control group and not involved in the dance sessions performed all the balance tests. None of the other measurements were blinded.

Exercise intensity

To indicate exercise intensity of each of the four dances, ambulatory heart rate (HR) was measured from each participant with a HR monitor (Zephyr™ BioHarness™, Zephyr Technology, Annapolis, Maryland) during the 2nd and 5th weeks of dance. These sampling times were arbitrarily selected to provide representative HR sampling but also so as not to disrupt the dance sessions unduly. For each of the four dances, HRs were averaged from all subjects at both sessions of weeks 2 and 5. Each type of dance was represented by 7–8 songs total. For analysis, HRs were expressed as a percentage of each individuals age predicted maximal HR, where maximal HR =207–(0.7 × age) [36]. Exercise intensity was also indicated by ratings of perceived exertion (RPE) [12], which have shown to be valid in persons with MS [37,38].

Statistics

Statistical software (IBM SPSS, version 23, SPSS Inc., Chicago, IL) was used for all statistical analyses. Descriptive HR results from the dance group are presented as mean (SD). Because of the small number of subjects in this initial pilot study, as well as the ordinal nature of our questionnaires, non-parametric Wilcoxon signed rank tests were used to perform longitudinal paired comparisons for each variable within each of the dance intervention and control groups. If a variable changed over time in either group, then non-paired comparisons of the post to baseline change in those variables were performed between dance and control groups using Mann–Whitney *U*-tests. Significance was nominally accepted as $p \leq 0.05$, though exact *p* values are presented. Grouped data are presented as median (Q1, Q3)

Results

Subjects

Seven persons with MS participated in the dance group and six persons with MS were in the control group. All subjects were women except for one man in the MS dance group. There were no differences in age (dance = 49 (40, 55), control = 55 (46, 59) yr., $p = 0.18$), height (dance = 168 (156, 177), control = 166 (154, 175) cm, $p = 0.88$), or weight (dance = 69 (52, 100), control = 69 (59, 69), $p = 0.83$). All subjects had relapsing-remitting MS except for one person in the dance group who had primary progressive MS. There was no difference in Patient Determined Disease Steps between groups (dance = 2 (1,4), control = 2 (1,4), $p = 0.93$), where 2 represents moderate disability but with minimal limitations to walking. No subjects dropped out of either group and all in the dance group fulfilled the compliance criteria. There were no falls, or other injuries and all expressed a desire to continue the dance program after it ended.

Dance and exercise

As indicated in Table 1, the tempos or speed of the music used for the four dance types ranged from an average of 82 to 126 beats per minute for the waltz and push-pull, respectively. In response to the style and tempo of each dance, average HRs attained while dancing were about 60% of age predicted maximum for all dances. Predicted peak HRs in response to each dance ranged from an average of 64% to 69% predicated maximal HR. Commensurate with the HR response, average RPE ranged from 11 to 12.

Table 1. Dance tempos and markers of exercise intensity.

	Rumba		**Foxtrot**		**Push-Pull**		**Waltz**	
	Mean (SD)	**Range**	**Mean (SD)**	**Range**	**Mean (SD)**	**Range**	**Mean (SD)**	**Range**
Tempo (beats/min)	117 (8)	108–129	121 (9)	109–142	126 (5)	118–132	82 (9)	59–89
HR average (% max)	57 (9)	40–66	59 (7)	48–69	59 (7)	53–69	60 (9)	48–70
HR peak (% max)	64 (9)	46–75	68 (5)	64–75	67 (7)	57–82	69 (9)	56–80
RPE	11 (3)	7–17	11 (2)	7–17	11 (2)	8–15	12 (2)	8–15

Values are mean (SD), range. Heart rate (HR) is expressed as % of age predicted maximum using the formula of Gellish et al. [36]. Ratings of perceived exertion (RPE) are based on the Borg 20-pt scale [12].

Dance and psychosocial/physical efficacy

Dance and control group data are presented in Tables 2 and 3. One subject from the dance group confided at post-testing that they had experienced a negative life event during the dance intervention. This event was not related to the dance program and because it occurred after baseline testing we thought it might confound our analysis. Because this person was also 3 SD from mean in the Beck Depression Inventory, their data were removed from all intervention analyses. Thus, dance outcome results are based on 6 from the dance group. Where appropriate, we indicate how results differed from if this person were included.

Table 2. Intervention outcomes from six persons with MS who participated in a ballroom dance program.

	Pre-dance		**Post-dance**		
	Median	**Min, Max**	**Median**	**Min, Max**	***p***
PROMIS Global Health	40	29, 45	42	34, 48	0.03*
MS Self-efficacy Control	770	430, 900	765	620, 900	0.46
MS Self-efficacy Function	865	600, 900	865	690, 900	0.18
MS Exercise Self-efficacy	65	29, 87	73	37, 91	0.21
Fatigue Impact Scale	35	6,109	21	2, 105	0.07
Beck Depression Inventory	7	0, 12	1	0, 5	0.07
Berg Balance Scale	55	40, 56	56	45, 56	0.07
Dynamic Gait Index	20	13,23	22	18, 24	0.11
Timed up and go (s)	10.3	8.9, 15.3	10.1	7.3, 13.0	0.08
MS Functional Composite Score (Z-score)	0.25	−1.33, 0.35	0.47	−0.90, 0.55	0.03*
9-Hole peg test (s)	21.6	17.8, 30.5	20.8	18.6, 29.0	0.35

25-ft Walk test (s)	4.9	4.0, 7.5	4.9	4.3, 7.3	0.53
PASAT	49	31, 55	55	45, 60	0.03*

Data are median (Minimum (Min), Maximum (Max)). Within-group paired comparisons were performed with Wilcoxon signed rank tests with significance at $p \leq 0.05$. Significant changes are indicated by asterisk (*).

Table 3. Time control outcomes from six control persons with MS who did not participate in the ballroom dance intervention (control).

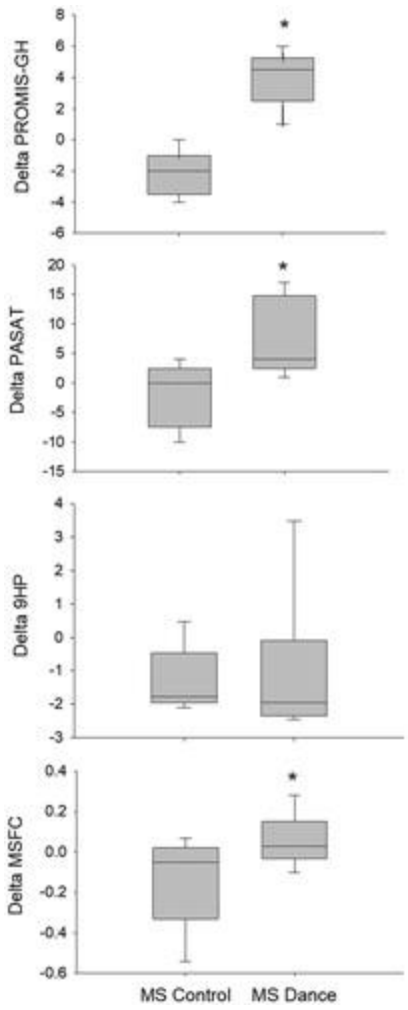
	Baseline		**Post-6 weeks**		
	Pre-dance	**Min, Max**	**Post-dance**	**Min, Max**	***p***
PROMIS Global Health	41	36, 50	39	35, 50	0.41
MS Self-efficacy Control	765	510, 850	745	470, 890	0.89
MS Self-efficacy Function	855	640, 900	830	690, 900	0.34
MS Exercise Self-efficacy	67	55, 98	66	49,95	0.75
Fatigue Impact Scale	19	0, 90	26	0, 91	0.23
Beck Depression Inventory	4	0, 8	4	0, 19	0.18
Berg Balance	55	26, 56	56	27, 56	0.32
Dynamic Gait Index	21	0, 24	23	22, 24	0.18
Timed up and go (s)	9.3	8.0, 15.2	9.4	7.1, 15.1	0.35
MS Functional Composite Score (Z-score)	0.33	−2.2, 1.2	0.59	−0.89, 0.55	0.50
9-hole peg test (s)	21.8	17.8, 30.5	16.5	18.6, 27.8	0.14
25-ft Walk test (s)	4.4	3.2, 8.1	4.5	3.9, 7.4	0.89
PASAT	57	10, 59	49	5, 59	0.47

Data are median (Minimum (Min), Maximum (Max)). Within-group paired comparisons were performed with Wilcoxon signed rank test with significance at $p \leq 0.05$. There were no significant changes in any measure after 6 weeks.

After the dance intervention, the dance group reported improved health-related quality of life (i.e., PROMIS-GH) as well as a trend toward improved fatigue and depression. Furthermore, cognition improved, as indicated by the PASAT. This improvement in the PASAT largely contributed to the significantly improved MS Functional Composite Score. There was a trend toward improvement in balance measures including the timed up and go. No changes were observed in self-efficacy. The significant improvement in quality of life and the trends toward improved fatigue and depression were not evident in our original data set ($n = 7$) which included the subject having undergone a negative life event.

In contrast, no statistically significant changes occurred in the control group (Table 3). Based on significant change over time, comparisons between post minus baseline change, or delta values of PROMIS-GH, PASAT, and MS Functional Composite Score, were performed between groups and all were significantly different (Figure 1).

Figure 1. Change from baseline in PROMIS Global Health, Paced Auditory Serial Addition Test (PASAT), 9-hole peg test (9-HPT), and Multiple Sclerosis Functional Composite (MSFC) Score in a multiple sclerosis (MS) dance and MS control group. Box is median (straight line) 25th and 75th percentiles (Q1, Q3). Whiskers are minimum and maximum. Significant, $p \leq 0.05$; Mann–Whitney unpaired comparisons between groups are indicated by asterisk (*).



Discussion

Our data confirm the feasibility of partnered ballroom dance and for the first time to our knowledge describe that dance can be of a mild-to-moderate exercise intensity for persons with MS. Further, we report the novel findings that measures of quality of life and cognition improved in persons with MS after this form of partnered social dance.

The feasibility of ballroom dance for persons with MS was highlighted by high compliance, lack of falls or injuries, and anecdotal reports of enjoyment and wishing to continue. In addition, both the average HR and Rating of Perceived Exertion responses to dance were consistent with a light to moderate exercise intensity as established by the American College of Sports Medicine [12]. This is in contrast to the high exercise intensities recorded in competitive ballroom dancers [39]. Recreational ballroom dance could then be suggested as a component of any physical activity or exercise program to meet activity guidelines for persons with MS [13] or more generally for adults [12]. One important aspect of partnered ballroom dance is that dynamic balance demands can be lessened though partner support that would not otherwise be available when participating in other rhythmic movements or free-form dance in which a partner is not available. This could allow for standing activity that would not otherwise be available to a person who may require an ambulatory aid. The dances we examined were

all closed position dances to provide maximal contact and support except for the push-pull, which did still provide some contact and support.

Self-reported health-related quality of life as indicated by the PROMIS-GH improved after a six-week dance intervention. Anecdotally, participants verbalized that they enjoyed themselves, moving to the music, interacting with the instructor, and the socialization among themselves. We speculate that these personal and situational factors may have contributed to the improved quality of life as well as the high exercise compliance observed in the present cohort, as reported previously [40,41]. However, we have no data to directly support these hypotheses currently. Quality of life improved independently of self-efficacy as no changes were noted in self-efficacy. However, self-efficacy baseline scores were initially high leading to a "ceiling effect" and suggesting a selection bias for those with already adequate self-efficacy and who may have been seeking participation as a means for physical activity.

Physical activity is thought to improve fatigue and depression in persons with MS though this is an area of ongoing investigation [2]. Our pilot data suggest that in the absence of a life-altering event, there is a tendency for these two potentially debilitating symptoms to improve.

By its nature, ballroom dance, with differing novel movement patterns, would be thought to challenge balance. Our results using clinical balance measures did not show improvements in static (i.e., Berg Balance Scale) nor dynamic balance (i.e., Dynamic Gait Index), though there was a tendency towards improvement in both measures. This was in contrast to improved Dynamic Gait Index after salsa dance [23]. However, both this present and previous study [23] relied on small sample sizes and only the present had a control group comparison. Accordingly, our results suggest that our sample size may have lacked power to detect differences in static or dynamic balance. Further, we again likely encountered a "ceiling effect" as we did not specifically recruit persons with poor balance as evidenced by near maximal initial Berg Balance Scale and Dynamic Gait Index scores. Nevertheless, because of anecdotal claims of balance improvement from several dance participants in the present study, further study is warranted in persons with MS with a wider range of disability or perhaps a different type of dance.

Changes in physical function were similar to those reported in persons with MS after salsa dance; there was no change in the timed 25-ft walk test and though not significant, a trend toward improved timed up and go [23]. Any physical improvements may be more specific to lower body function as no improvements were noted in upper body function as indicated by the 9-HPT.

To our knowledge, cognitive improvement has not been reported before in persons with MS after a dance intervention. We believe cognition was challenged through the dual cognitive motor task nature of the dance intervention which could have resulted in cognitive adaptation and improvement. This challenge could have come in the learning of new motor patterns, recalling these patterns, moving in multiple directions, processing multiple sensory stimuli in a complex environment, reacting to stimuli provided by a dance partner, initiating a lead, or adjusting movement skill temporally to different tempos of music, often while trying to carry on a conversation.

Ballroom dance is a versatile form of physical activity or exercise that can be adapted to a variety of abilities. While ballroom dance can be high-intensity exercise [39], we have shown that it can also be adapted or chosen to be appropriate for a range of fitness levels or ambulatory ability. For example,

dance intensity could be altered by dance type or tempo. In this regard, faster tempo dances including waltz, push-pull, swing, or salsa could provide more moderate- to high-intensity activity. For example, waltz and salsa can provide moderate- to high-intensity exercise in clinical and non-clinical adult populations [19,42,43]. A previous study of the effects of salsa dance on persons with MS did not provide tempos or any other indicator of exercise intensity precluding direct comparison to the present study [23]. In contrast, in a recreational setting, selected tempos of waltz, foxtrot, or rumba can provide a low to moderate intensity as demonstrated by this present study.

For all dances, complexity can be introduced with variations of the basic dance or by introducing stylistic elements, for example, a longer stride length. Thus, while some participants could be "gliding" across the floor trying out variations, others theoretically might only be comfortable with small movement basic steps, possibly in one half-time with respect to tempo. However, in both cases, all could be dancing together to the same music at the same time.

Partnered recreational social dance is somewhat unique compared to other forms of exercise or physical activity in that it relies on a partner, is social, and is music-based. It could be that other partnered dances of similar intensity, and support, to varying degrees, would result in similar improvements.

Future studies are required to determine if benefits of partnered social dance are specific to partnered dance compared to non-partnered dance or more traditional group or individual-based exercise in persons with MS. Nevertheless, because ballroom dance was found to be beneficial for people with MS, it could be an important physical activity alternative to more structured exercise and could also provide clinicians or other caregivers with specific recommendations for physical activity options.

The small sample size of this study limited our statistical power as evidenced by the *p* values as well as subsequently performed *post hoc* power analyses [44] which ranged from 0.30 to 0.60 for primary non-significant variables, indicating the possibility of type II errors. Other limitations include ceiling effects from a sample of convenience, lack of blinding, and the comparatively short duration of the intervention in our experimental group. However, the strength of our study was the inclusion of a MS control group where we found no change in any variable of interest. These findings provide additional confidence in our results and provide rationale for future studies. We conclude that recreational partnered social dance provides a mild-to-moderate exercise intensity that can contribute to daily physical activity or exercise in a fun and social setting. Further, despite the small sample size, a biweekly six-week program of recreational ballroom dance can result in improved quality of life and cognition in persons with mild-to-moderate MS. This dance intervention may also be beneficial for balance, fatigue, or depression for some, but further research is necessary to know with more confidence.

Acknowledgements

We wish to thank the National Multiple Sclerosis Society – Wisconsin Chapter as well as the associated OptiMiStics group for helping with initial development, publicity, and recruitment for this study. The Patient Determined Disease Steps is provided for use by the NARCOMS
Registry: www.narcoms.org/pdds. NARCOMS is supported in part by the Consortium of Multiple Sclerosis Centers and the Consortium of Multiple Sclerosis Centers Foundation.

Disclosure statement

The authors have no conflicts of interest to report.

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