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A community-based Argentine tango dance program is associated with increased activity participation among individuals with Parkinson disease

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Abstract

Objective—To determine the effect of a 12-month community-based tango dance program on activity participation among individuals with Parkinson disease (PD).

Design—Randomized controlled trial with assessment at baseline, 3, 6, and 12 months.

Setting—The intervention was administered in the community; assessments were completed in a university laboratory.

Participants—Sixty-two volunteers with PD enrolled in the study and were randomized to treatment group. Ten participants did not receive the allocated intervention, so the final analyzed sample included 52 participants.

Intervention—Participants were randomly assigned to the Tango group, which involved 12 months of twice weekly Argentine tango dance classes, or to the no intervention Control group (n = 26 per group).

Main Outcome Measures—Current, new and retained participation in instrumental, leisure and social activities as measured by the Activity Card Sort (with the “dance” activity removed).

Results—Total Current participation in the Tango group was higher at 3, 6, and 12 months compared to baseline ($p = 0.008$), while the Control group did not change ($p = 0.11$). Total Activity Retention (since onset of PD) in the Tango group increased from 77% to 90% ($p = 0.006$) over the course of the study, whereas the Control group remained around 80% ($p = 0.60$). These

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The trial was registered on ClinicalTrials.gov as “PD4PD: Partnered Dance for Parkinson Disease,” CT0138856.

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patterns were similar in the separate activity domains. The Tango group gained a significant number of New Social activities ($p = 0.003$), but the Control group did not ($p = 0.71$).

Conclusions—Individuals with PD who participated in a community-based Argentine tango class reported increased participation in complex daily activities, recovery of activities lost since the onset of PD, and engagement in new activities. Incorporating dance into the clinical management of PD may benefit participation and subsequently quality of life for this population.

Keywords

Parkinson disease; exercise; rehabilitation; social participation; quality of life

Parkinson disease (PD) is a neurodegenerative disorder that affects over one million North Americans¹. In PD, degeneration of dopamine-producing neurons in the substantia nigra disrupts basal ganglia functioning. This results in motor dysfunction, most prominently tremor, rigidity, akinesia, bradykinesia, and postural instability. In addition, individuals with PD can experience a variety of non-motor problems such as sensory disturbances, cognitive impairment, autonomic dysfunction, and psychological changes^{2,3}. As PD progresses, it can hinder the individual's ability to perform activities of daily living (ADL), leading to dependency on others^{4,5}. As such, PD is associated with reduced quality of life⁶⁻⁸ and significant socioeconomic costs⁹.

Although loss of independence in ADL (i.e., disability) is thought to occur in the middle or moderate stages of disease progression⁴, emerging research¹⁰ suggests that PD can negatively impact participation early in the disease. The International Classification of Functioning, Disability and Health (ICF) defines participation as involvement in life situations and the extent to which individuals are engaged in a societal context¹¹. Individuals with early and mild PD, for whom motor dysfunction is not yet sufficient to cause physical disability, report reduced participation in instrumental, low physical-demand leisure and social activities compared to healthy, age-matched peers^{10,12}. Furthermore, participation restrictions among individuals with PD are associated with reduced health-related quality of life^{12,13}. Participation is positively correlated with functional status and life satisfaction^{14,15} and may be protective against physical and cognitive decline as people age^{16,17}. These links highlight the importance of pursuing interventions targeted at improving participation for those with PD. Dopaminergic medication does not adequately address many of the factors which contribute to reduced participation in this population including impaired mobility, depressive symptoms, and cognitive dysfunction^{10,13,18}. There is a need for more comprehensive approaches to manage the complex manifestations of PD and their effects on individuals' participation.

One adjunct to medical treatment that is beneficial for PD patients is exercise. Exercise has been found to improve physical function, mobility, cognition, and health-related quality of life among individuals with PD¹⁹⁻²¹. Unfortunately, more than half of all American seniors do not engage in the recommended amount of exercise, and those with PD engage in 15% less exercise than their healthy peers²². Because of this, the identification of alternative forms of exercise that are at least as effective as traditional exercise programs but foster better adherence are needed. Individuals with PD report that social support and social interaction positively influence their exercise adherence, with one of the most salient motivators being spousal participation^{23,24}. Dance is a form of partnered exercise that provides social engagement and, importantly, has been found to have a higher adherence rate than other forms of exercise among individuals with PD²⁵. At the end of a study comparing traditional exercise to dance²⁶, nearly half of the participants in the dance group chose to continue to participate in the dance classes while no participants from the traditional exercise class continued their form of exercise. Instead, some of the participants

from the traditional exercise group chose to attend the dance classes after the study was complete.

In addition to promoting better adherence, dance may improve upon the beneficial physical effects of traditional exercise. In the study described above²⁵, the dance group showed significant improvements in balance, whereas the traditional exercise group did not. Argentine tango was found to be a particularly effective form of dance, resulting in larger improvements in balance, mobility, movement initiation, and attention to movement control compared to other forms of dance (waltz and foxtrot)²⁷. The positive effects of Argentine tango on physical function (e.g., motor dysfunction severity, balance, gait) and progression of motor symptoms were recently confirmed in a randomized controlled trial of a long-term community-based tango dancing program²⁸.

The benefits of tango dancing may extend beyond physical improvements to stimulate broader participation in life activities and roles for those with PD²⁹. For example, partnered exercise programs can facilitate the development of social support networks, thereby increasing opportunities for social participation outside of the formal program²³. Interventions for improving participation among individuals with PD have previously been unexplored. The purpose of this study was to determine whether the community-based tango dance program that reduced disease severity and improved physical function in a group of PD patients²⁸ affected activity participation. We hypothesized that PD participants who engaged in the dance program would report increased activity participation over the course of the study relative to a control group of participants with PD who did not engage in the dance program.

METHODS

Participants

Participants were recruited from the clinical research database of the Washington University School of Medicine (WUSM) Movement Disorders Center, the WUSM Research Participant Registry, neurologists in the St. Louis area, and advertisements in the newsletter of the Greater St. Louis Chapter American Parkinson Disease Association. All participants were diagnosed with idiopathic PD using published clinical diagnostic criteria³⁰, were classified as Hoehn and Yahr stages I–IV³¹, and experienced clear motor benefit from levodopa. Participants had to be able to walk independently for 10 feet with or without an assistive device. Individuals were excluded if they had a history of neurological deficit other than PD, serious medical problem(s), evidence of abnormality other than PD-related changes on brain imaging, or history or evidence of musculoskeletal or psychological problems. This study was approved by the institution's Human Research Protection Office, and all participants provided written informed consent.

Intervention

This was a single-blind randomized controlled trial. Upon enrollment, participants were randomly assigned to the Tango or Control group. The protocol for the tango intervention was based on prior investigations of the effects of Argentine tango for individuals with PD³². Tango participants attended one-hour dance classes two times per week for 12 months. Dance classes were taught by an experienced dance instructor who was trained and supervised by the principal investigator (G.E.) to ensure appropriateness and safety for individuals with PD. The classes consisted of progressive Argentine tango lessons in which participants learned a new step in each class. This form of dance involved flexible, improvisational step patterns composed of small step elements, spontaneous multi-directional changes, and rhythmic variation. Individuals with PD were paired with

individuals who did not have PD. These dance partners were caregivers (e.g., spouses, family members) who accompanied PD participants to the classes and healthy young volunteers recruited from health-related graduate and undergraduate departments at Washington University in St. Louis (volunteers received special training on fall prevention and safety). All individuals, regardless of gender, were asked to dance in both the leader and follower roles to ensure that everyone spent similar amounts of time moving forward and backward. In addition, participants changed partners every ten minutes, a practice commonly used in dance classes to facilitate learning. Control participants were asked to continue the normal life routine that they had engaged in before enrolling in the study.

Assessment Procedure

Control and Tango participants were evaluated at baseline and then at 3, 6, and 12 months post-baseline. All assessments were conducted while participants were off their regular anti-parkinsonian medications (12 hour washout period) by a blinded rater (R.D.) at the WUSM Program in Physical Therapy. The full evaluation consisted of a variety of measures to characterize physical function and mobility, including the Unified Parkinson's Disease Rating Scale sections 1–3³³ (for a complete description of study measures, see²⁸). The Beck Depression Inventory-II^{34,35} was administered to assess depressive symptoms. Participation, the primary outcome for this analysis, was measured using the Activity Card Sort (ACS)³⁶. The ACS is a standardized assessment that measures perceived level of participation in daily life activities as well as changes in participation in relation to certain events (e.g., the onset of disease or disability, beginning a new treatment regimen) or over specified periods of time (e.g., in the past five years). It consists of 89 cards containing pictures of people involved in activities that fall into one of four domains: (1) Instrumental activities (20 items; e.g. grocery shopping, doing laundry, household maintenance), (2) Low-demand Leisure activities (35 items; e.g. cooking as a hobby, playing table games, reading, watching movies or television), (3) High-demand Leisure activities (17 items; e.g. swimming, woodworking, hiking, fishing, gardening), and (4) Social activities (17 items; e.g. traveling, eating at a restaurant, volunteer work, spending time with friends). Participants sorted the cards into one of five categories with the corresponding numerical point values: *Continue to Do since Illness [at pre-illness level]* = 1, *Do Less since Illness* = 0.5, *Given Up Due to Illness* = 0, *New Activity since Illness* = 1, or *Not Done Prior to Illness* = 0. Parkinson disease was the "Illness" to which the categories referred. As per published scoring criteria³⁶, Current participation scores were calculated by summing the point values for the activities sorted into the *Continue to Do*, *Do Less*, and *New Activity* categories. Activities sorted into the *Continue to Do*, *Do Less*, and *Given Up* categories each also received 1 point for Previous participation. Activity Retention since PD Onset was calculated by dividing Current by Previous participation scores. These calculations were completed for all activities (Total) and for the separate activity domains (Instrumental, Low-demand Leisure, High-demand Leisure, Social). The ACS includes "dancing" as a social activity; however, this item was removed from analysis so it would not inflate the Tango participants' scores. In the present study, Total Current and Previous scores could range from 0 to 88, and separate activity domain scores could range as follows: Instrumental: 0–20, Low-demand Leisure: 0–35, High-demand Leisure: 0–17, Social: 0–16. Higher scores indicate participation in more activities. Activity Retention scores could be above 0%, with higher scores indicating proportionately more activities retained since the onset of PD. The ACS has strong psychometric properties in community-dwelling samples of healthy adults^{14,36–37} and those with various neurological conditions (i.e., Alzheimer's disease, multiple sclerosis, stroke)³⁷, including good internal consistency, test-retest reliability, and construct validity. The ACS demonstrated sensitivity to change in a sample of individuals with stroke in response to a community rehabilitation program³⁸.

Statistical Analyses

Descriptive statistics were calculated for all variables. Group characteristics at baseline were compared using independent samples t-tests, Wilcoxon signed rank tests for ordinal scales (e.g., Hoehn and Yahr stage), and Chi-squared tests for categorical data (e.g., gender). Longitudinal analyses were conducted using mixed-model 2×4 analyses of variance with group (Tango, Control) as the between-subjects factor and time (baseline, 3, 6, and 12 months) as the within-subjects factor. Planned pairwise comparisons were used to characterize change over time within each group. An intent-to-treat analysis was employed including all participants who completed the baseline and 3-month evaluation and carrying forward last recorded data for those who dropped out after this point. A significance level of 0.05 was used in all statistical analyses, and p-values < 0.10 were considered trends.

RESULTS

Participant characteristics

Sixty-two individuals with idiopathic PD (30 Control, 32 Tango) enrolled in this study, were randomized to treatment group and completed the baseline evaluation. Fifty-two participants (26 Control, 26 Tango) completed the 3-month evaluation and were included in the current analysis (Figure 1). Sample characteristics are presented in Table 1. There were no differences between the Tango and Control groups at baseline with regards to gender, age, duration and severity of PD, or depressive symptoms (all $p \geq 0.25$)

Activity Participation

Current Participation—There were no group differences in Current participation at baseline for Total activities or for the separate activity domains (all $p \geq 0.15$). There was an effect of time, $F(3, 48) = 2.78, p = 0.04$, and a trend for a time by group interaction in Total Current participation, $F(3, 48) = 2.55, p = 0.06$ (Figure 2). Planned comparisons indicated that there was a main effect of time in the Tango group, $F(3, 48) = 4.05, p = 0.01$, but not the Control group, $F(3, 48) = 0.96, p = 0.42$. Specifically, the Total Current participation of the Tango group was higher at 3, 6, and 12 months compared to baseline (all $p \leq 0.008$), while the Control group did not change (all $p \geq 0.11$). Analysis of the separate activity domains (Figure 3) showed a similar pattern for Low-demand Leisure activities, such that there was a main effect of time for the Tango group, $F(3, 48) = 4.75, p = 0.006$, but not for the Control group, $F(3, 48) = 1.36, p = 0.27$. Low-demand Leisure participation was higher in the Tango group at 3, 6, and 12 months compared to baseline (all $p \leq 0.03$), while the Control group did not change (all $p \geq 0.50$). There were no significant effects for High-demand Leisure, Instrumental or Social activities (all $p \geq 0.11$).

Activity Retention since PD Onset—There was a main effect of time for Total Activity Retention, $F(3, 48) = 3.70, p = 0.02$. The time by group interaction did not reach significance ($p = 0.15$); however, as with Total Current Participation, planned comparisons revealed a significant effect of time within the Tango group, $F(3, 48) = 4.68, p = 0.006$, but not the Control group, $F(3, 48) = 0.631, p = 0.60$ (Figure 4). Over the course of the study, the percentage of pre-PD activities engaged in by the Tango group increased from 77% to 90%, whereas the Control group remained around 80%. Analysis of the separate activity domains (Figure 5) revealed significant effects of time on Instrumental and Low-demand Leisure Activity Retention in the Tango group, $F_s = 3.7, p_s = 0.02$, but not the Control group, $F_s < 0.47, p_s \geq 0.70$. Percentage of pre-PD Instrumental activities increased from 76% at baseline to 87% at 3 months before declining to 81% at 12 months in the Tango group but remained around 80% in the Control group. Percentage of pre-PD Low-demand Leisure activities increased from 79% to 106% in the Tango group but remained at 84% in the Control group. This indicates that the Tango participants reported engaging in *more* Low-

demand Leisure activities at the end of the study compared to before the onset of PD. There was an effect of time for Social Activity Retention, $F(1, 50) = 13.75, p = 0.001$. Percentage of pre-PD Social activities in the Tango group increased from 85% at baseline to 94% and 102% at 3 and 6 months, respectively, before declining to 89% at 12 months, $F(3, 48) = 4.83, p = 0.005$. After an initial increase from 85% at baseline to 90% at 3 months in the Control group, there was a decline to 82% at 12 months, $F(3, 48) = 2.61, p = 0.06$. There were no significant effects for High-demand Leisure Activity Retention (all $p > 0.25$).

New Activities—There was a main effect of time on New Activity participation, $F(3, 48) = 9.83, p < 0.001$, such that both groups reported more new activities at 3, 6, and 12 months compared to baseline (all $p < 0.001$) (Figure 6). On average, the Tango group reported 2.6 ($SD = 3.9$) new activities at each time point and the Control group reported 1.4 ($SD = 3.6$). The effect of time was significant for each activity domain, $F(3, 48) = 5.46, p < 0.01$ (Figure 7). However, for New Social activities, it was qualified by a time by group interaction, $F(3, 48) = 4.26, p = 0.03$, such that there was a significant effect of time in the Tango group, $F(3, 48) = 5.38, p = 0.003$, but not the Control group, $F(3, 48) = 0.47, p = 0.71$. The Tango group gained a significant number of new Social activities from baseline to 3, 6, and 12 months ($M = 0.5, SD = 1.1; p < 0.001$) but the Control group did not ($M = 0.15, SD = 0.48; p > 0.31$).

DISCUSSION

The purpose of this study was to examine the effects of a community-based Argentine tango dance program on activity participation among individuals with PD. Volunteers with PD were randomized to participate in 12 months of Argentine tango classes (Tango group) or to continue their daily routine as usual (Control group). As hypothesized, participants in the Tango group reported increased activity participation over the course of the study. Moreover, they recovered a significant proportion of the activities they had lost since the onset of PD. Activity participation among individuals in the Control group remained relatively stable.

Our results extend previous work²⁸ and suggest that in addition to improving physical function among individuals with PD, socially engaging and functional, skill-based exercise promotes participation in instrumental, leisure and social activities. The changes in participation observed in the Tango group appear to be driven by a combination of increased engagement in prior activities done less or given up since the onset of PD as well as engagement in novel activities. The only activity domain for which participation did not increase in the Tango group relative to the Control group was High-demand Leisure. Tango participants were required to attend the dance classes and, as such, were engaging in a high-demand leisure activity that was not captured by our outcome measure (because this item was removed); however, they did not report participating in additional exercise activities outside of the dance classes. There are a number of potential reasons for this, including lack of opportunities or access to exercise or being satisfied with the level of exercise offered by the dance classes. Regardless, by engaging in more instrumental, low-demand leisure and social activities, participants in the Tango group did boost their overall level of physical activity, which simply requires bodily movement that increases energy expenditure above the basal level and can include occupational, household, transportation, and leisure activities³⁹.

Of the separate activity domains, Low-demand Leisure showed the most consistent improvements, with Tango participants engaging in more of these types of activities by the end of the study than they had before the onset of PD. This outcome is significant, as participation in low-demand leisure activities has been associated with improved mental health in older adults¹⁴. It is important to note that while the activities in this domain are not

as physically demanding as those in the High-demand Leisure domain, many place significant demand on mobility (e.g., going to the museum, recreational shopping) or other functions affected by PD such as cognition and fine motor coordination (e.g., games, puzzles, needlecrafts). Some also involve social interaction. Thus, rather than representing the adoption of a more sedentary lifestyle, increased low-demand leisure participation may reflect a higher level of daily challenge and engagement for individuals with PD.

There are a number of ways in which Argentine tango could positively influence activity participation in PD. As a form of physical exercise, it benefits PD-related mobility impairments and may even slow disease progression (for a discussion of these effects, refer to ²⁸), which could result in improved capacity for daily performance and participation. Importantly, progressive tango classes have features that may additively benefit participation compared to traditional exercise. For example, tango requires working memory, control of attention and multitasking to integrate newly learned and previously learned dance elements, stay in rhythm with the music, and maneuver around others on the dance floor. Leading requires self-initiated movements and motor planning while following requires reading and responding appropriately to the leader's body cues ²⁵. These cognitive challenges may further improve capacity for daily performance and result in increases in, or maintenance of, participation.

The social interaction, social support and social influences that emerged from the tango classes likely also had positive effects on participation. The group setting provided an opportunity for social modeling, the establishment and reinforcement of social norms regarding health-promoting behavior, and the development of social networks ⁴⁰. In fact, participants in the Tango group reported engaging in social activities together outside of class, including attending a play, the symphony, and a social dance. On an individual level, the presence of a partner may have helped those with PD to feel more comfortable challenging themselves in the complexity and difficulty of movements ²⁷, thereby providing the opportunity for mastery experiences, a primary source of self-efficacy ⁴¹. Improvements in self-efficacy that occurred during the tango classes could have translated to daily life, cultivating the desire to go out and engage in more or new activities, re-try activities that had been given up, or devote the necessary effort and persistence required to maintain one's current level of activity.

Study Limitations

There was no control for attention and social interaction across groups, so it is possible that the changes in participation observed in the Tango group were due to non-specific effects of socializing. However, studies in older adults have shown that exercise outcomes are more strongly predicted by the social cognitive factors associated with exercise, such as improved self-efficacy, rather than by social interaction alone ⁴². Thus, we propose that the improvements in participation in the Tango group are larger than what would occur from socialization alone. Future studies should incorporate a social control group and measure social cognitive factors to provide stronger support for this conclusion.

Our attrition rate was relatively high compared to previous exercise studies in PD ^{43, 44}. Attrition may have been a function of the research study rather than of the intervention itself. Participation in the study required four off all antiparkinsonian medication evaluations at a separate location from the dance class. This feature likely added a level of burden or discomfort that would not be present in a community-based dance program alone. Importantly, the Tango participants who completed the entire study were actively engaged in the intervention as evidenced by an average of nearly 80% attendance to all classes. This adherence rate is good compared to other 12-month exercise trials in older adults e.g., ⁴⁵. Furthermore, most of these participants (13/16) chose to continue attending the dance

classes after the study was over. Thus, dance appears to be an enjoyable and highly motivating form of physical activity for some people with PD. Formalized follow up, perhaps using the ACS with the “dancing” item re-incorporated, would provide support for this notion and help to determine longer term effects of the intervention. Consistent with the notion that a one-size-fits-all approach to promoting exercise will not be efficacious, but instead, that exercise recommendations should be tailored to individuals’ needs, desires and barriers ⁴⁶, these findings suggests the need for continued identification of alternative, effective forms of exercise for the diverse population of individuals with PD.

While the ACS provides a broad picture of a person’s perceived participation in complex daily activities, it may not have fully captured all changes in participation in our sample. For example, it allows for the measurement of New Activities but does not include a “Do More” category, and therefore cannot account for increased participation in existing activities. In addition, the ACS does not provide information regarding factors such as length of time spent engaged in activities, the relative importance of activities to people, satisfaction with participation, or difficulty experienced while performing activities. Participation is a complex and multidimensional construct. The present study has provided initial support for the efficacy of community-based dance for improving participation among individuals with PD. Future work can investigate the nature of changes in participation that are occurring as well as the relative importance of the various facets of participation to overall health and well-being in PD.

CONCLUSIONS

In summary, we found that engagement in a community-based Argentine tango dance class is associated with increased activity participation among individuals with PD. To our knowledge, this is the first study to test the effect of any intervention on activity participation in this population. Rehabilitation research in PD primarily focuses on motor impairment and physical disability, measuring outcomes at the level of functional mobility and self-care ADL. Given its importance for health and well-being ^{14, 16, 47}, optimal participation in all the activities and roles of daily life should be the ultimate goal of rehabilitation for PD and should be a primary outcome in intervention studies. Our findings suggest that dance, a socially-engaging form of exercise, should be included in the clinical management of PD. Future work should examine longer term effects of the intervention and investigate the potential biological and psychosocial mechanisms underlying the benefits of dance for individuals with PD.

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Abbreviations

ADL	Activities of daily living
ACS	Activity Card Sort

PD	Parkinson disease
UPDRS	Unified Parkinson's Disease Rating Scale

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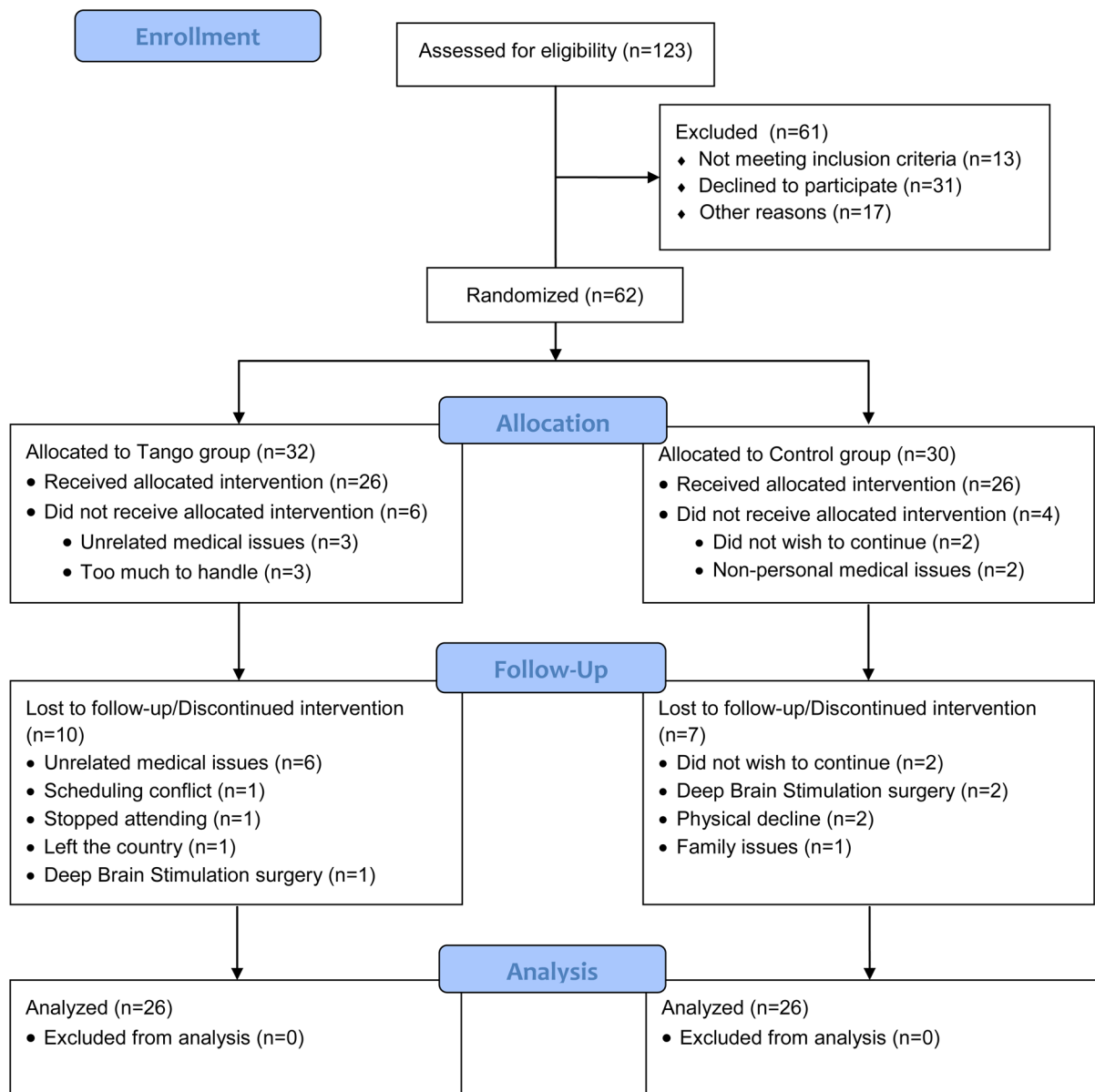


Figure 1. CONSORT flow diagram illustrating participant recruitment, randomization, and attrition. All participants retained through 3 months were included in the final analyzed sample; last observations from those who dropped out after 3 months were carried forward for intent-to-treat analysis.

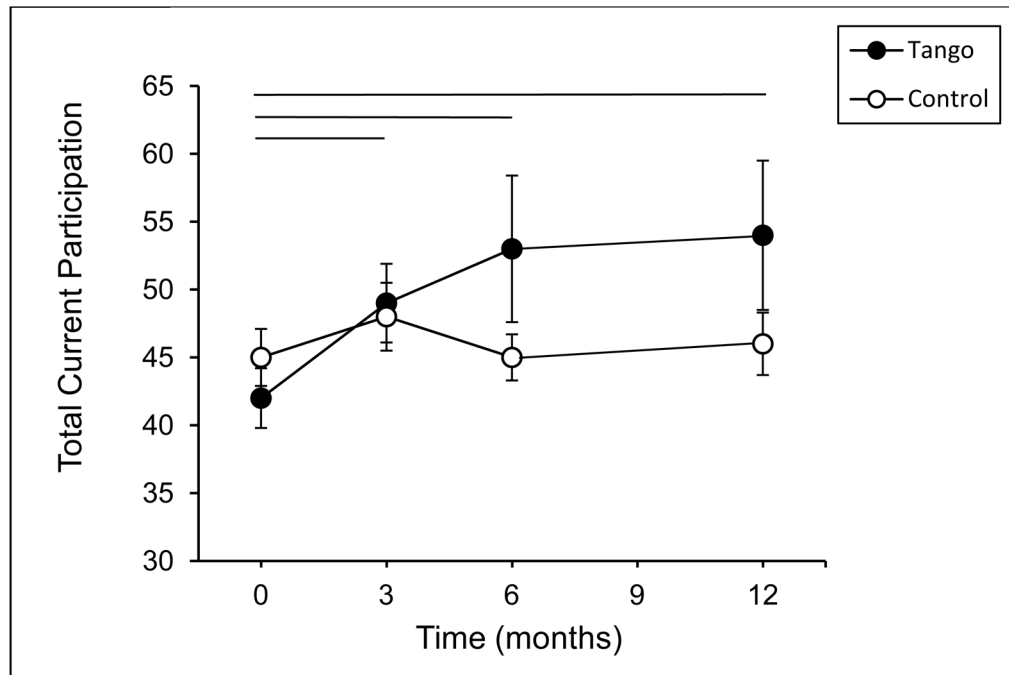


Figure 2. Total Current Participation scores on the Activity Card Sort (ACS) at baseline, 3-, 6-, and 12-month evaluations for the Tango and Control groups. Values are means \pm SEs. Horizontal lines indicate a significant difference within the Tango group between the time points spanned by the line.

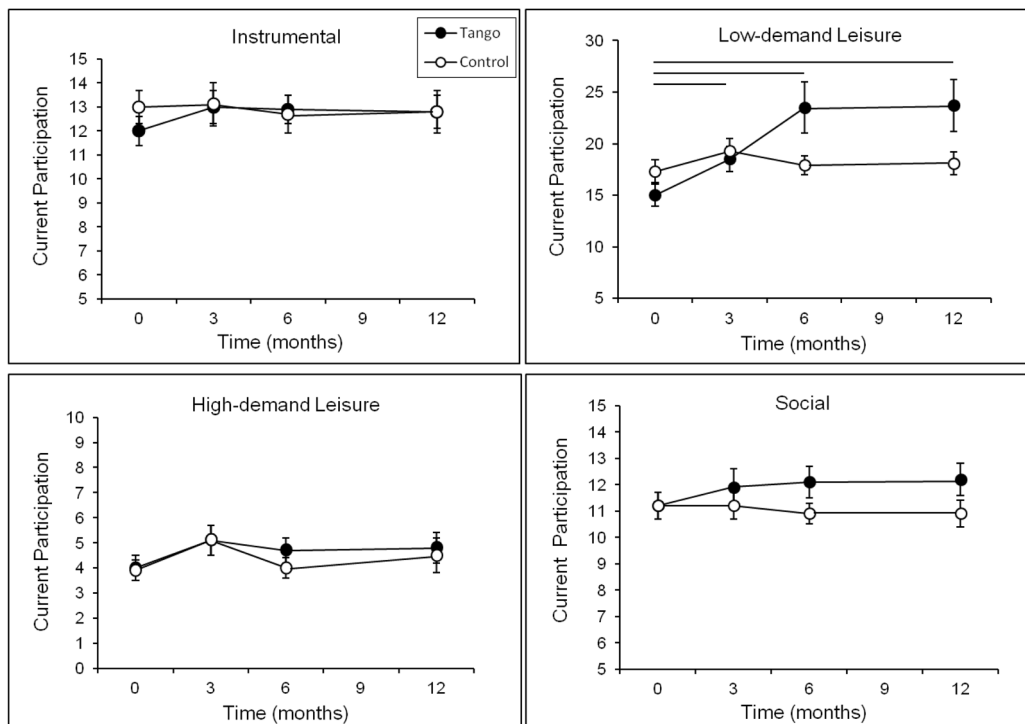


Figure 3. Current Participation scores on the Activity Card Sort (ACS) for each activity domain at baseline, 3-, 6-, and 12-month evaluations for the Tango and Control groups. Values are means \pm SEs. Horizontal lines indicate a significant difference within the Tango group between the time points spanned by the line.

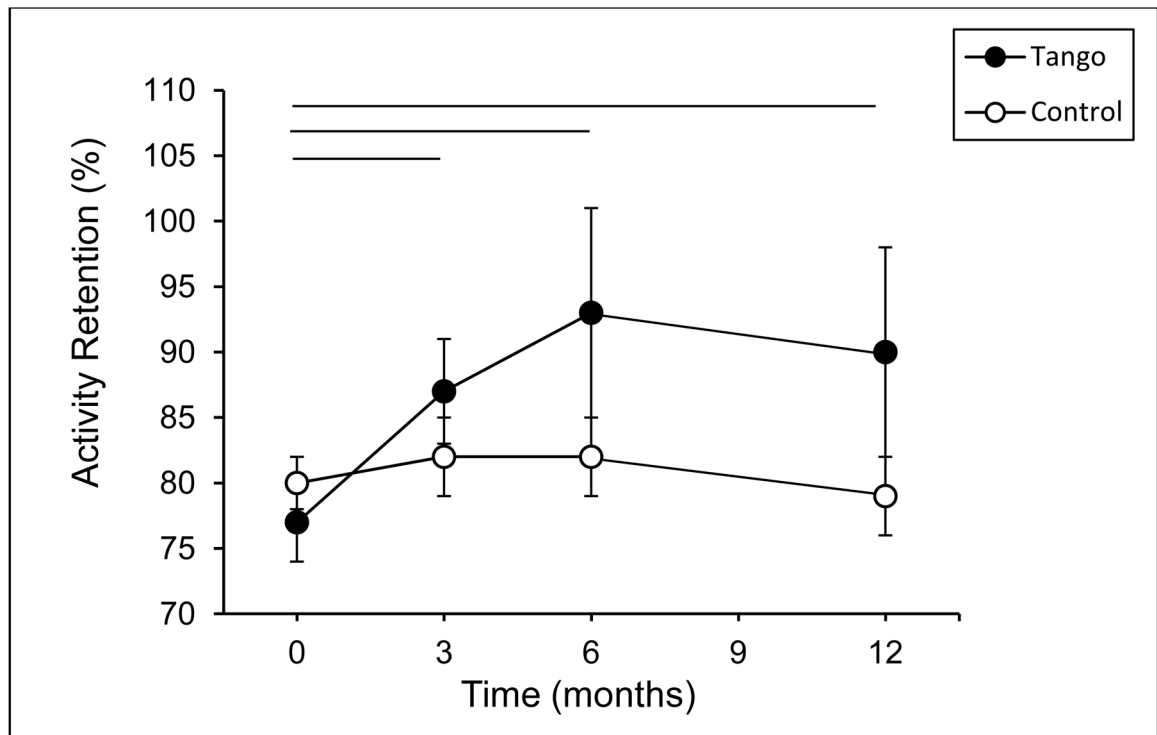


Figure 4. Total Activity Retention scores on the Activity Card Sort (ACS) at baseline, 3-, 6-, and 12-month evaluations for the Tango and Control groups. Activity Retention scores represent the proportion of pre-PD activities currently engaged in, calculated as Current Participation/Previous Participation. Values are means \pm SEs. Horizontal lines indicate a significant difference within the Tango group between the time points spanned by the line.

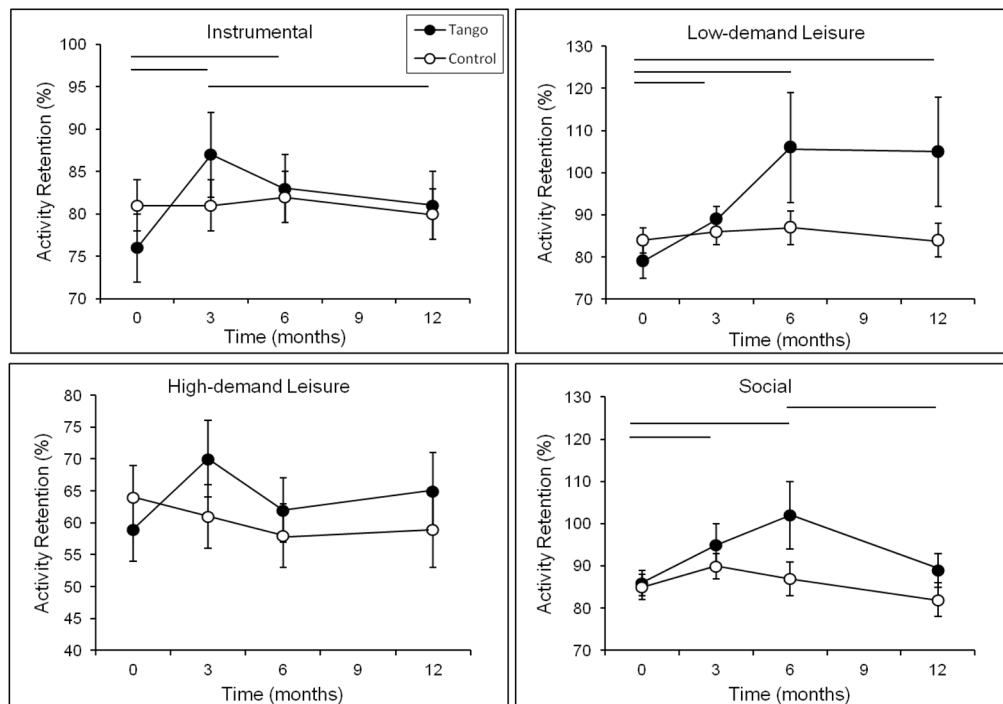


Figure 5. Activity Retention scores on the Activity Card Sort (ACS) for each activity domain at baseline, 3-, 6-, and 12-month evaluations for the Tango and Control groups. Values are means \pm SEs. Horizontal lines indicate a significant difference within the Tango group between the time points spanned by the line.

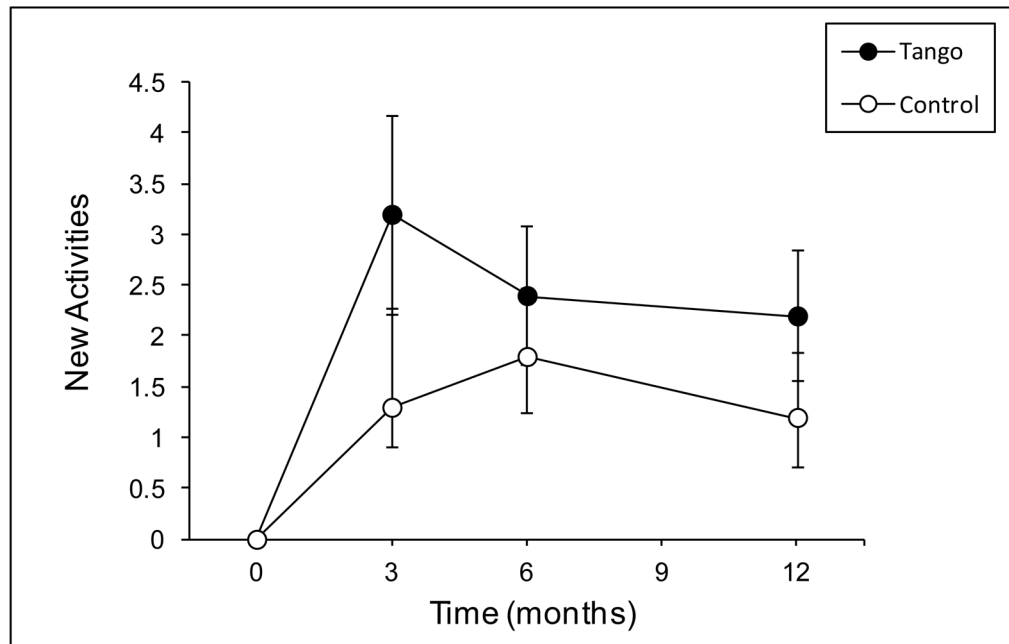


Figure 6. Total New Activity scores on the Activity Card Sort (ACS) at baseline, 3-, 6-, and 12-month evaluations for the Tango and Control groups. Values are means \pm SEs. Both groups reported more new activities at 3-, 6-, and 12-months compared to baseline.

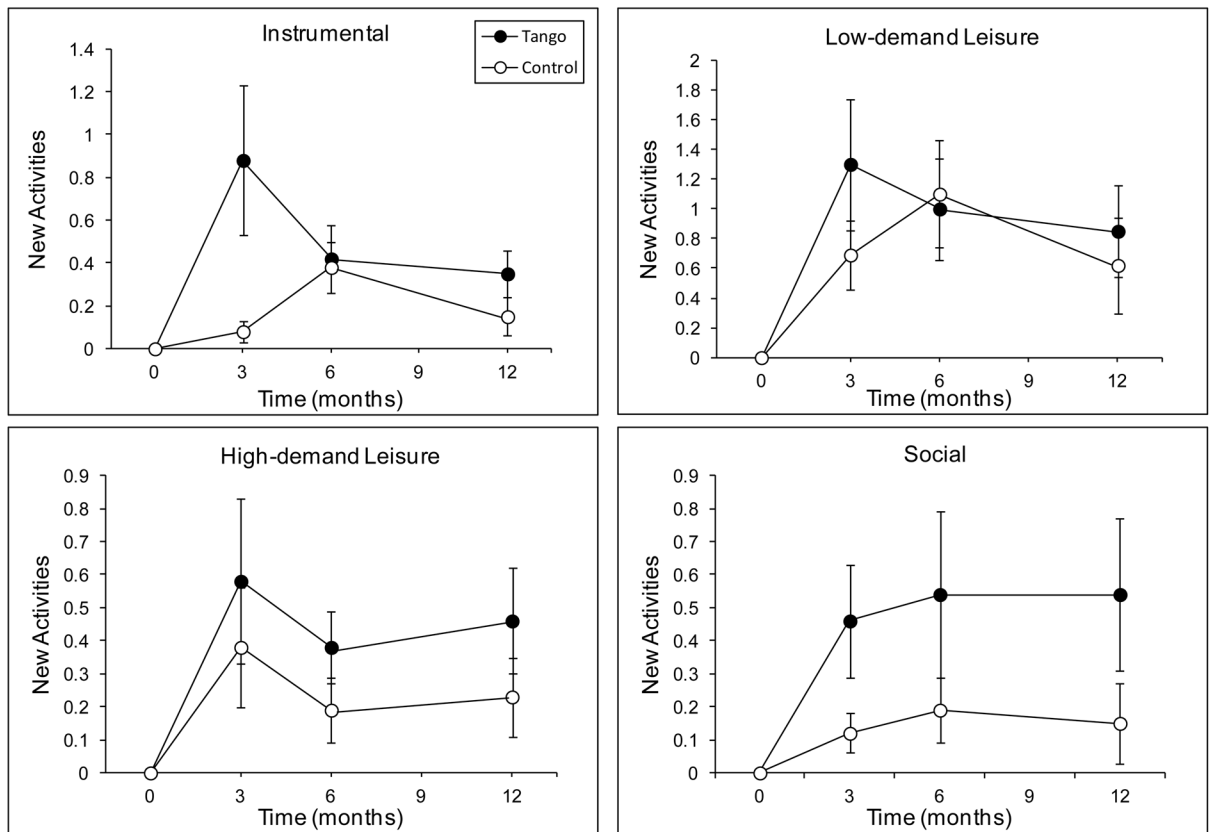


Figure 7. New Activity scores on the Activity Card Sort (ACS) for each activity domain at baseline, 3-, 6-, and 12-month evaluations for the Tango and Control groups. Values are means \pm SEs.

Table 1Demographic and clinical characteristics for each group at baseline ($N=52$).

	Control	Tango
n	26	26
Male/Female ratio (n)	15/11	15/11
Age in years	69.0 (7.8)	69.3 (9.4)
Hoehn & Yahr Stage (n)		
2	9	11
2.5	11	10
3	5	5
4	1	0
UPDRS 1	12.5 (6.7)	10.7 (4.9)
UPDRS 2	13.8 (7.8)	13.2 (7.9)
UPDRS 3	48.0 (9.0)	44.5 (11.9)
Years since diagnosis	7.0 (4.8)	5.8 (5.4)
BDI-II	11.4 (7.0)	9.3 (6.2)

Numbers represent means (standard deviation) or number of participants. UPDRS = Unified Parkinson's Disease Rating Scale; BDI-II = Beck Depression Inventory II.