Health-related quality of life in frail institutionalized elderly: effects of cognition-action intervention and Tai Chi

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Key words: Tai Chi, frail institutionalized elderly, HRQOL, self-efficacy, functional score
Abstract:

No previous studies have explored the effects of mind body approaches on health-related quality of life (HRQoL) in frail elderly. Cognition and action are an inseparable whole while functioning. Thus, a new intervention-based approach using familiarity-based movements and non-judgmental approach “cognition-action” was proposed and was tested with Tai Chi on HRQoL in frail institutionalized elderly.

Forty-two elderly (58% women) aged 65 to 94 were proposed a 24-week Tai Chi (TC) intervention four days a week versus a cognition-action (CA) exercise program of 30 minutes twice a week. Changes in Mini Mental State score, Physical (PCS) and Mental Component (MCS) summaries (SF12), Falls Efficacy Scale (FES), and Exercise self-efficacy were explored.

PCS improved from 33.6±6.7 to 51±4.8 in the TC group and 30.6±9.9 to 45.1±10.2 in the CA group (P< .001). MCS of SF-12 (P< .001), FES (P< .001) and Exercise Self-efficacy (P< .01) enhanced significantly in both groups.

Adapted cognition-action programs and Tai Chi were both efficient in improving HRQoL of frail elderly.
Introduction

An extremely sedentary lifestyle is common in elderly subjects living in institutions and has significant negative impacts on health-related quality of life (HRQoL) (Richardson, Bedard, & Weaver, 2001). The promotion of light-to-moderate exercise for institutionalized elderly has been recommended for improving HRQoL and reducing frailty (Bourdel-Marchasson & Berrut, 2005; "Guidelines for the prevention of falls in elderly. American Geriatrics Society, British Geriatrics Society, and American Academy of Orthopaedic Surgeons Panel on Falls Prevention", 2001; Lazowski et al., 1999; Spirduso & Cronin, 2001). Recent studies have suggested that TC exercises may improve strength, balance, muscular function (Wu, Zhao, Zhou, & Wei, 2002; Xu, Hong, Li, & Chan, 2004) and psychological functioning through a reduction of fear of falling, an improvement in self-efficacy and overall health in the elderly (Chou et al., 2004; Dechamps, Lafont, & Bourdel-Marchasson, 2007; Li, Harmer, Fisher, & McAuley, 2004; Li et al., 2005; Li et al., 2001; Wolf et al., 2003; Zhang, Ishikawa-Takata, Yamazaki, Morita, & Ohta, 2005). Although these findings support the benefits of TC as an exercise therapy, participants in these studies were robust elderly. No previous studies have explored the effects of TC exercises on HRQoL among institutionalized elderly.

Though there is evidence concerning the large benefits of exercise in maintaining and improving functional and mental components of quality of life in the elderly, no recommendations have been made to date concerning the structure of exercise programs for frail institutionalized elderly (Dechamps, Lafont, & Bourdel-Marchasson, 2007; "Guidelines for the prevention of falls in older persons. American Geriatrics Society, British Geriatrics Society, and American Academy of Orthopaedic Surgeons Panel on Falls Prevention", 2001; Nelson et al., 2007). TC is assumed to be a mind-body therapy, which makes it distinctly different from conventional rehabilitation programs, so it may have internal components that could potentially provide psychological and quality of life benefits in institutionalized elderly.
(Dechamps, Lafont, & Bourdel-Marchasson, 2007; Li et al., 2004; Li et al., 2001). However, it is still unclear whether the observed health benefits of exercise are solely due to physical activity internal components of TC (e.g., round and circular movements based on image recollection) or the adapted physical activity expert behavioral approach. Mind-body approaches are characterized by a perception of unity between cognition and action, the two entities being an inseparable whole while functioning (Bedny, Karwoski, & Bedny, 2001; Csikszentmihalyi, 1991). In short, the concept of unity between these two phenomena highlight the relationship between the experience of movement organization and functioning and the reduction of cognitive entropy, which help the individual to be in a positive state (“Flow”) while doing something (Csikszentmihalyi, 1991, 1997). An intervention based on this principle was named cognition-action (CA).

An unresolved question therefore is whether TC or CA benefits elderly who are frail. Fatigability is very common in institutionalized old adults, so long-term practice may be necessary to maintain or attain notable benefits. In a recent review, a high frequency TC program (4-5 times a week) was found to produce more functional benefits than a low frequency one, although no data are available concerning frail elderly (Dechamps, Lafont, & Bourdel-Marchasson, 2007). So far, little is known about the possible health benefits from differences in frequency of exercise session according to exercise programs.

The aim of this paper was to explore the clinical effectiveness of two exercise interventions in terms of HRQoL benefits and attendance record. We therefore compared the effects over 24 weeks of a TC program to a cognition-action program for frail institutionalized elderly with different pathologies and conditions on HRQoL variables. It was hypothesized that the cognition-action intervention may be the most effective to improve HRQoL.
Methods and Procedures

Subjects

Ninety participants were screened from two nursing homes and one long-term care home during individual interviewing. To reflect the real life ecosystem of geriatric institutions, inclusion criteria were broad: age 65 or older, ability to get up alone or with technical or human help if necessary and ability to understand basic motor commands. Terminally ill and bedridden patients were excluded. From the original recruitment pool, 48 patients did not meet the inclusion criteria. A total of 52 patients (mean age 80.7 ± 8.9 years) were recruited from the two nursing homes (N=32) and the long-term care home (N=20) and gave their informed consent. Fifty-one patients were widowed, 1 was married, and all of them lived in a 24-hour care setting. The institutional Review Board of the State Hospital Research University, Bordeaux, France approved the study protocol. The intervention groups were randomly determined on a 1:1 ratio to receive either 24 weeks of Tai Chi (TC) (n=26) or a cognition-action program (CA) (n=26). All exercise sessions were conducted in a group and given at the patients’ facilities. Subjects were diagnosed using the DSM IV-TR criteria for dementia types and psychiatric disorders (American Psychiatric Association & American Psychiatric Association. Task Force on DSM-IV., 2000).

Over a one-week period, all assessments were completed by appropriate members of an interdisciplinary team who were blind to treatment allocation and study outcomes.

Intervention

The TC classes were taught by an experienced instructor who followed an adapted variation of the Yang style for elderly, which emphasizes body sensation, awareness of multidirectional weight shifting, body alignment, and multisegmental movement coordination (Li, Fisher, Harmer, & Shirai, 2003). Deep breathing and traditional TC muscular reinforcement exercises were integrated in the TC routine. The instructor highlighted the TC theory of mind-body
balance, which focuses on cognitive and behavioral strategies to strengthen willingness. After taking the population characteristics into consideration, TC was defined as four sessions of 30 minutes a week over the course of the 24 weeks. Intensity of exercise was considered within the context of participants’ physiological capabilities (i.e., frail elderly) and was from light-to-moderate intensity.

The cognition-action (CA) comparison group met for 30 minutes and progressed to 40 minutes, twice a week, for 24 weeks. This program was monitored by an adapted physical activity teacher and consisted predominantly of lower-body muscle exercises, arm and abdominal reinforcement, ankle and wrist exercises, and deep abdominal breathing and relaxation. Each session comprised a warm-up for 10 minutes, followed by stepping exercises, upper-lower multisegmental-body coordination, and stretching exercises with most of the exercises performed seated. The main objective for the patients was to be able to complete long series of exercises without discomfort. The sessions had no particular therapeutic objectives. The method rationale was “to stick” to the patient’s time perception of his own progresses, and to help him find his own situational awareness and comfort. During sessions, the instructor issued information relevant to health: changes in body-functioning, balance, falls prevention and lifestyle issues such as flow experience (Csikszentmihalyi, 1997), stress and self-confidence. The instructor used verbal persuasion, incremental objectives and added enactive mastery experience during the completion of exercises to maximize participation and to enhance self-efficacy (Bandura, 2005). All the information was given to participants independently of their cognitive impairments. Cognition was introduced during practice using collaborative change-talk in relation to the patients’ verbal and cognitive impairments. The concepts of importance and confidence were issued during the change process (Dunn & Rollnick, 2003). Using familiarity of movements, brief motivational communication, encouragements, and by keeping attention task-oriented, the instructor controlled participants’
frustration during practice and solicited self-regulative resources in terms of completing the specific tasks the subjects were engaged in (Csikszentmihalyi, 1997; Egan, 2002; Miller & Rollnick, 2002).

To clarify the cognition-action method, we now describe a possible five-minute interaction with an Alzheimer’s patient (gender: female, severe aphasia, severe spasticity of the upper limbs, no hearing or vision impairment, unable to stand on one leg, MMSE score around 10/30) with aberrant motor behavior such as pacing during a session. The interaction starts with a presentation of oneself, what will be done during the interaction and questions about how the patient feels, independently of his abilities to understand and answer. To introduce trust, the expert uses brief motivational interviewing (e.g., complimenting and talking about the patient’s progresses since the last session, asking about what he (she) thinks about it). Physical and verbal guidance may serve as incentives to the patient during the repetition of a familiarity-based movement (e.g., cycling while seated), while the repletion of the exercise serves as a trigger to reduce muscle spasticity and cognitive entropy. During this interaction, the other patients from the group may perform a specific exercise (alone or in dyad). Overall, the CA exercises are of light-to-moderate intensity.

The two intervention groups had two distinct characteristics. First, speed of motion was predominantly slower in the TC group. Second, in terms of cognitive encoding and retrieval of episodic memory, TC performance relied more on image recollection (Brauer, Woollacott, & Shumway-Cook, 2001; Wolf et al., 2003) whereas the CA approach mainly used familiarity-based movements (Dolcos, LaBar, & Cabeza, 2005).

**Measures**

**Health-Related Quality of Life**

HRQOL outcome measures were quality of life using the SF-12 (Ware, Kosinski, & Keller, 1995). The SF-12 is a general health state self-report questionnaire reflecting how respondents
are able to function, how they feel, and what they think their health status is. The SF-12 is very sensitive to changes in health status and disease severity. Physical (PCS) and mental (MCS) health summary scores are determined using scoring algorithms (Ware, Kosinski, & Keller, 1995). Each subscale is scored from 0 to 100, with higher scores indicating better physical and mental health. Mood was assessed using the self-reported 15-item Geriatric Depression Scale (GDS-SF), the score ranging from 0 to 15 with higher scores indicating more depressive symptoms (Lesher & Berryhill, 1994), and the Falls Efficacy Scale (FES), which evaluates the confidence that individuals have to complete 10 basic activities of daily living without the fear of falling (Tinetti, Richman, & Powell, 1990), the score ranging from 10 to 100 with higher scores indicating less efficacy. Cognitive function was evaluated at baseline and after 24 weeks using the MMSE (Folstein, Folstein, & McHugh, 1975).

Self-efficacy

Exercise self-efficacy represents the confidence that individuals have to perform physical activities, persevere when facing barriers or obstacles and how resilient they are when confronted with difficulties on a certain physical activity. The term “Tai Chi” in the TC exercise self-efficacy scale (Taylor-Piliae & Froelicher, 2004) was modified to “adapted physical exercises” to facilitate assessment and participants’ understanding of exercise self-efficacy; a global score from 0 to 100 was calculated, with higher scores indicating greater exercise self-efficacy.

Physical functioning

Physical functioning was assessed using the Timed Up and Go (TUG) test (Podsiadlo & Richardson, 1991) (time taken to rise from a chair, walk 3 meters, return, walk back to sit down) and the One leg Stance (OLS) (time taken to stay in equilibrium while standing on one leg). Psychological and functional measurements were taken at baseline and at the end of the 24-week program.
**Intervention Adherence**

Adherence was assessed by keeping weekly attendance records in 4 categories including: presence, absence for medical reasons, absence due to other activities (e.g. group activities, family appointment), and absence (e.g. refused, missed schedule).

**Statistics**

All analyses were conducted on an intention-to-treat basis. All baseline results are therefore presented and there were no missing data at baseline. Patients who withdrew or were hospitalized or left the facilities during the course of the 6-month intervention were not included in further analysis and missing responses were considered as missing. All analyses were performed using SPSS (SPSS Inc., Chicago, IL). Prior to all analysis, data distribution was explored and all the variables were normally distributed. We assessed changes in outcome measures over time and between groups by using global linear models (GLM). Post hoc mean comparisons with Bonferroni correction were performed to confirm post-treatment differences. P values <0.05 were considered to be statistically significant.

**Results**

**Baseline Characteristics**

The two intervention groups were comparable on all baseline measures (table 1) and the subjects (N=52) presented a light-to-moderate cognitive impairment with a mean (SD) MMSE score of 19.98 (6.67). No difference was found in any of the items between the patients who withdrew, were hospitalized or left the facilities and the ones from their initial randomized allocation group at baseline. Patients did not differ according to their mental status in key functional or health-related quality of life measures (table 2). None of the participants had previously practiced or heard of Tai Chi Chuan.

**Intervention Compliance, Attrition, Adverse Events**

Class sizes in both groups ranged from five to 11 people (mean 8). A total of 8 patients
withdrew from the study immediately after they were randomly allocated to intervention (TC, 4; L, 4). Of the 44 remaining participants, 4 people were hospitalized for health-related causes independent from training (n=4 in TC) and 4 others left the facilities (3 in TC; 1 in L) during the 24 weeks. Intervention class compliance was calculated across the 24-week period (96 sessions for TC and 48 for the CA group) for all class-attending participants (n=36; TC, n=15; L, N=21). The average ± standard deviation attendance in the TC group was 63.0±27.0% (range 10.5-93.0%) and was 64.5±25.0% (range 4.0-98.0%) for the CA group. The average absence due to medical reasons in the TC group was 6.5±6.0% (range 1.0-25.0%) and was 6.0±4.0% (range 0-12.5%) in the CA group. The average absence due to personal or other group activities in the TC group was 3.5±2.0% (range 0-7.0%) and was 4.0±4.0% (range 0-10.0%) in the CA group. Average absence, which included refusal to participate, no reason, bad mood and others, was 27.0±29.0% (range 2.0-84.0%) in the TC group and 25.5±23.0% (range 2.0-77.0%) in the CA group. No statistical difference was found on any of the above categories.

At the end of the 24-week intervention, only one participant among the TC group was able to reproduce the complete TC form without a model.

**Measures**

Table 2 presents participants’ neuropsychiatric diagnoses and cognitive status, mood and quality of life at baseline and end of intervention in both groups. No difference was found in physical and mental component scores of the SF-12 or in depression across neuropsychiatric diagnoses. Multivariate Analysis of Variance (MANOVA) showed no effect of MMSE scores on mood or overall quality of life at any time point. At the end of intervention, all sub-groups had improved on mood, SF-12 mental and physical scores independently of their cognitive status. At 24 weeks, the MMSE scores remained stable.

Table 3 displays the extent of improvement in the TC and CA groups for MMSE, Timed Up
and Go, One Leg Stance, fear of falling, GDS and the SF-12. Repeated measure of variance showed no between-group difference. The Physical and Mental Component Scores of the SF-12 progressed significantly across the 24 weeks. Exercise Self-efficacy was significantly improved in both intervention groups. Significant reductions in Fear of Falling and depression were observed in both groups after 24 weeks of intervention. The physical functioning measures indicated that significant improvements were detected in the One Leg Stance scores and the TUG in both TC and CA groups.

Discussion

The main finding of this study was that a cognition-action exercise program offers similar health-related quality of life benefits as the TC in a frail institutionalized elderly population. Moreover, these effects were achieved in a short time, thus increasing the likelihood of clinical applications. Several arguments could explain these results. According to both the movement cognitive encoding and retrieval of episodic memory and the patients’ overall deconditioning, a 6-month intervention could promote easier movement reproduction and retrieval (e.g., cognition-action movements), so the potential long-term effects of Tai Chi movement encoding and reproduction could not be assessed in our study. Since repletion of movements could have potential benefits on cognitive entropy (Csikszentmihalyi, 1997), participants recalled that they felt emotionally positive during most of the sessions. Overall, emotional memory may have been enhanced across the 24-week intervention, resulting in mood and mental health improvements. Indeed, the likely residual benefits of such recall have already been demonstrated in young adults (Dolcos, LaBar, & Cabeza, 2005). Even if cognition worsened and regardless of the neuropsychiatric diagnoses, quality of life did not decrease in this frail elderly population. Furthermore, HRQoL did not differ according
to cognitive status, which is consistent with previous studies (Hoe, Katona, Roch, & Livingston, 2005; Sullivan, Kempen, Van Sonderen, & Ormel, 2000). In line with previous data, the functional improvements obtained in both interventions may have served as an incentive for the participants to become more physically active and to have more self-confidence in their functional abilities (Brassington, Atienza, Perczek, DiLorenzo, & King, 2002; Jones, Harris, Waller, & Coggins, 2005; King et al., 2000; Spirduso & Cronin, 2001). The present study shows that light-to-moderate intensity exercises decrease mood disturbances, increase self-efficacy and enhance quality of life in geriatric populations (United States. Public Health Service. Office of the Surgeon General., National Center for Chronic Disease Prevention and Health Promotion (U.S.), & President's Council on Physical Fitness and Sports (U.S.), 1996). Other potential explanations of our results are that mood and mental health could mediate the observed benefits on HRQoL. Furthermore, CA used familiarity-based movements, which may have maximized the potential effect of routinization on well-being (Bouisson & Swendsen, 2003) over a more decontextualized movement-based approach like TC.

The inclusion criteria enabled enrolment of participants with a broad range of mental and functional pathologies. These broad criteria are one of the strengths of this study in terms of implementation in other settings. The sample was significantly more physically and mentally impaired than in previous studies (Faber, Bosscher, Chin, & van Wieringen, 2006; Li et al., 2005; Nndonim et al., 2006; Wolf et al., 2003; Zhang, Ishikawa-Takata, Yamazaki, Morita, & Ohta, 2005). For example, the median one leg stance eyes open score on the right foot at baseline was 1.88 seconds (range 0.44-16.83) in the study by Wolf and al. (Wolf et al., 2003) compared with 0.3 second (range 0-11) at baseline and 1.21 seconds (range 0-51.4) at 24 weeks in our study. The attrition due to adverse events, such as hospitalization and baseline
functional scores found herein, revealed the frailty of institutionalized elderly, suggesting that the participants in the Wolf study were less frail than ours. However, our results should be interpreted with caution. This was a pilot study, the population was extremely frail and the sample was relatively small. Moreover, we did not add a control arm, so our results should be interpreted in terms of possible clinical utility according to intra-group improvements in HRQoL.

We used physical activity recommendations (United States. Dept. of Health and Human Services., 2000) such as frequency and duration in the TC group, resulting in 48 hours of training over the 24-week period, whereas the CA group had a minimum of 24 hours of training. In previous studies, the amount of training was 78 hours over 26 weeks (Li et al., 2005) and a minimum of 96 hours over 48 weeks in a more physically impaired cohort (Wolf et al., 2003). Our data may have several clinical significances, considering the acceptable attendance record, the patients’ pathologies and characteristics, and how elderly adhere to physical activity (McAuley, Jerome, Elavsky, Marquez, & Ramsey, 2003; Schutzer & Graves, 2004). The findings indicate that in frail institutionalized elderly, 24 hours of training over 24 weeks can lead to an improvement in HRQoL.

Conclusion

This pilot study shows that a CA program and adapted Tai Chi improved quality of life in frail elderly subjects. Our data suggest that a CA approach and Tai Chi in the secondary prevention of pathological ageing could have clinical relevance in terms of HRQoL benefits over a 6-month period. Future exercise programs should focus on who should be targeted for which type of exercise, instructor supervision, and the efficiency of the manner in which each exercise is provided (frequency, duration, setting, instructor counseling approach and cultural aspects) in terms of HRQoL benefits and the adherence mechanisms underlying these effects.
Reference:


Table 1: Baseline Characteristics

<table>
<thead>
<tr>
<th>Variables</th>
<th>Tai Chi (n=26) (mean ± S.D.)</th>
<th>Cognition-action group (n=26) (mean ± S.D.)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age in Year</td>
<td>80.8 ± 8.7</td>
<td>80.6 ± 9.2</td>
<td>0.95</td>
</tr>
<tr>
<td>Female, n (%)</td>
<td>18 (69.2)</td>
<td>12 (46.1)</td>
<td>0.09</td>
</tr>
<tr>
<td>Mini Mental State Examination (MMSE)</td>
<td>19.38 ± 7.2</td>
<td>20.67 ± 6</td>
<td>0.98</td>
</tr>
<tr>
<td>Fear of falling by Falls Efficacy Scale</td>
<td>55.3 ± 26.1</td>
<td>47.8 ± 25.5</td>
<td>0.3</td>
</tr>
<tr>
<td>Geriatric Depression Scale</td>
<td>6.8 ± 3.12</td>
<td>7.5 ± 4.2</td>
<td>0.45</td>
</tr>
<tr>
<td>PCS-SF-12</td>
<td>33 ± 6.81</td>
<td>31.3 ± 9.3</td>
<td>0.45</td>
</tr>
<tr>
<td>MCS-SF-12</td>
<td>40.82 ± 10.6</td>
<td>40.4 ± 11.1</td>
<td>0.88</td>
</tr>
<tr>
<td>Exercise Self-Efficacy</td>
<td>34.4 ± 19.9</td>
<td>32.5 ± 20.84</td>
<td>0.74</td>
</tr>
</tbody>
</table>
Table 2: Participants’ cognitive characteristics and health-related quality of life at baseline and end of intervention

<p>| DSM IV-TR Diagnoses | Baseline testing | |End of Intervention|
|---------------------|------------------|------------------|
|                     | N    | MMSE | GDS | PCS-SF-12 | MCS-SF-12 | N    | MMSE | GDS | PCS-SF-12 | MCS-SF-12 |
| Alzheimer           | 3    | 13.7±8.6 | 4±3 | 30.7±3.7 | 48.6±11.1 | 3    | 15.3±8.1 | 3.7±2.3 | 53.3±1.3 | 42.1±12.1 |
| Other Dementia      | 20   | 17.2±6.4 | 6.7±4 | 31.5±8.4 | 40.1±11.5 | 16   | 16.7±6.6 | 6.6±5.1 | 44.6±10 | 46±13 |
| Depression          | 10   | 24.2±3 | 8.9±2.7 | 33.9±8.7 | 39.6±9.6 | 6    | 25.4±2.9 | 7.7±2.3 | 46.6±9.6 | 46.9±3.1 |</p>
<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>n</th>
<th>Mean ± SD</th>
<th>Mean ± SD</th>
<th>Mean ± SD</th>
<th>Mean ± SD</th>
<th>Mean ± SD</th>
<th>Mean ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bipolar disorder</td>
<td>6</td>
<td>19.8±7.4</td>
<td>6.7±4.1</td>
<td>29.3±9.4</td>
<td>42.3±12.2</td>
<td>6</td>
<td>22.6±4.9</td>
</tr>
<tr>
<td>Others</td>
<td>13</td>
<td>23.4±5.9</td>
<td>7.5±3.6</td>
<td>33.6±7.9</td>
<td>39.5±10.6</td>
<td>5</td>
<td>23.9±4.7</td>
</tr>
</tbody>
</table>

Notes: The patients were diagnosed using the DSM IV-TR. Patients with probable dementia of Alzheimer type are referred to as "Alzheimer"; other dementia types (mixed, vascular, alcoholic, Parkinson type) are referred to as "other dementia". Psychiatric disorders are depression and bipolar disorders. Patients with no dementia or psychiatric disorders are referred to as "others". A post-hoc subgroup analysis showed no significant difference on mean scores across the 5 categories at any time point in the intervention.
Table 3: Changes in health-related quality of life during the 24 weeks

<table>
<thead>
<tr>
<th>Variables</th>
<th>Baseline, n=15 (mean ± S.D.)</th>
<th>After 24 weeks, n=15 (mean ± S.D.)</th>
<th>Between subjects P value</th>
<th>Between group P value</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>mini Mental State Examination (MMSE)</em></td>
<td>19.4 ± 7.4</td>
<td>21.1 ± 6.4</td>
<td></td>
<td>0.6</td>
</tr>
<tr>
<td><em>Fear of falling by Falls Efficacy Scale</em></td>
<td>55.1 ± 23.44</td>
<td>16.8 ± 7</td>
<td>&lt;.0001</td>
<td>0.1</td>
</tr>
<tr>
<td><em>Geriatric Depression Scale</em></td>
<td>6.1 ± 3</td>
<td>4.5 ± 3.4</td>
<td>0.005</td>
<td>0.92</td>
</tr>
<tr>
<td><em>PCS-SF-12</em></td>
<td>33.6 ± 6.7</td>
<td>51 ± 4.8</td>
<td>&lt;.0001</td>
<td>0.45</td>
</tr>
<tr>
<td><em>MCS-SF-12</em></td>
<td>42 ± 12.2</td>
<td>47.6 ± 9.4</td>
<td>&lt;.002</td>
<td>0.72</td>
</tr>
<tr>
<td><em>Exercise Self-Efficacy</em></td>
<td>40.3 ± 21.4</td>
<td>56.3 ± 32.4</td>
<td>0.003</td>
<td>0.6</td>
</tr>
<tr>
<td>Test</td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
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<tr>
<td>----------------------------------</td>
<td>-----------</td>
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</tr>
<tr>
<td>One-leg Stance eyes open right</td>
<td>1.6 ± 2</td>
<td>4 ± 5.4</td>
<td>1 ± 2.4</td>
<td>4.7 ± 11.2</td>
</tr>
<tr>
<td>One-leg Stance eyes open left</td>
<td>1.2 ± 2</td>
<td>2.9 ± 3.3</td>
<td>0.45 ± 0.7</td>
<td>3.2 ± 6.7</td>
</tr>
<tr>
<td>Timed Up and Go test</td>
<td>25.2 ± 10.7</td>
<td>20.7 ± 10.8</td>
<td>28.1 ± 20.7</td>
<td>22.5 ± 14.7</td>
</tr>
</tbody>
</table>

Note: The P columns represent the effect from the repeated measures analysis of variance. The P value in the within-subjects effects table is expressed with the post hoc mean Bonferroni correction. No significant effects from treatment condition or treatment × condition interaction were observed.