Effects of Qigong in Promoting Health of the Wheelchair-Bound Older Adults in Long-Term Care Facilities
Shu-Chien Kuan, Kuei-Min Chen and Chi Wang
Biol Res Nurs published online 8 March 2011
DOI: 10.1177/1099800411399645

The online version of this article can be found at:
http://brn.sagepub.com/content/early/2011/03/07/1099800411399645

Published by:
http://www.sagepublications.com

Additional services and information for Biological Research For Nursing can be found at:

Email Alerts: http://brn.sagepub.com/cgi/alerts
Subscriptions: http://brn.sagepub.com/subscriptions
Reprints: http://www.sagepub.com/journalsReprints.nav
Permissions: http://www.sagepub.com/journalsPermissions.nav
Effectiveness of Qigong in Promoting the Health of Wheelchair-Bound Older Adults in Long-Term Care Facilities

Shu-Chien Kuan, MS, RN1, Kuei-Min Chen, PhD, RN2, and Chi Wang, MS, RN3

Abstract
Institutional wheelchair-bound older adults often do not get regular exercise and are prone to health problems. The aim of this study was to test the effects of a 12-week qigong exercise program on the physiological and psychological health of wheelchair-bound older adults in long-term care facilities. Study design was quasi-experimental, pre–post test, nonequivalent control group. Participants comprised a convenience sample of 72 wheelchair-bound older adults (qigong = 34; control = 38). The qigong group exercised 35 min/day, 5 days/week for 12 weeks. Measures for physical health (blood pressure, heart rate variability, and distal skin temperature) and psychological health (Brief Symptom Rating Scale-5) were collected before and during study Weeks 4, 8, and 12. The qigong group participants’ blood pressure, distal skin temperature, and psychological health were significantly improved (all p < .001). These findings suggest that qigong exercise is a suitable daily activity for elderly residents in long-term care facilities and may help in the control of blood pressure among older adults.

Keywords
health promotion, long-term care facilities, qigong, wheelchair-bound older adults

Population aging is a global trend (Lin, Huang, Chen, & Kuo, 2006). In 1993, 7.1% of Taiwan’s population was over 65 years old, and by the end of 2009, that percentage had increased to 10.7% (Ministry of the Interior Department of Statistics, 2010). Similarly, persons 65 years old and over comprised 12.8% of the population in the United States in 2008 (U. S. Census Bureau Net, 2010). Health care for this growing elderly population, especially those elders who are institutionalized, is expensive. About 25% of Taiwan’s annual budget for national health insurance is spent on the medical care of older adults. It is thus essential to promote the health of this elderly population in order to reduce national health care expenditures (Yu, Yu, & Yen, 2004).

Exercise and physical activity are known to improve the health of older adults (American College of Sports Medicine, 2008). According to Huang (2004), exercise for older adults should be slow and easy, such as walking, brisk walking, Tai Chi, or qigong (Feng, Hong, & Huang, 2004). In particular, qigong, a meditative physical exercise, is commonly acknowledged as being beneficial for the health of older adults (Mittelstaedt, Hinton, Rana, Cade, & Xue, 2005) and has been widely practiced to prevent and treat illnesses (Lee, Hong, et al., 2003). Qi is a Chinese word used to represent both the air we breathe in and out and our respiration of vital energy (Schnauzer, 2006). Gong is a Chinese word meaning self-training to the point of proficiency through daily practice (Caffrey & Fowler, 2003). Together, the two words refer to a Chinese breathing exercise (Koh, 1982). Qigong has been widely practiced in China for centuries, and many people in Western countries have also used it as a form of meditative exercise. In many Asian countries, qigong is a complete series of exercise believed to exert a positive effect on the human body through the relaxation of the body and mind (Mittelstaedt et al., 2005).

Previous investigators have found that qigong stabilizes the autonomic nervous system by adjusting parasympathetic nervous system activities, specifically by reducing blood pressure (BP) and improving heart rate variability (HRV). Gallia (1999) discovered that qigong practice could improve the function of the circulatory system and coordination and strengthen muscles. Lee, Lee, Choi, and Chung (2003) studied the effects of a 10-week qigong training on 58 middle-aged hypertensive adults and found that the BP of the qigong group participants significantly decreased posttraining (p < .001). Lee, Lim, Kim, and Lee (2004) found similar results in another group of 36 middle-aged hypertensive adults who participated in an...
8-week qigong training program. In another study, Lee and colleagues (2005) trained 30 male volunteers to practice qigong in Korea and found a significant difference in postraining in participants’ low- and high-frequency HRV ($p < .05$). After qigong exercise, participants reported that their hands and feet felt warmer; furthermore, researchers noted sweaty palms and glowing skin among participants after exercise. These phenomena could be due to enhanced blood flow to vessels serving distal areas. Agishi (1998) studied the effects of qigong on arterial occlusion in the lower extremities in 37 participants (male = 20; female = 17) and found a 90% increase in lower-limb skin temperature and an 89% increase in blood flow immediately post-exercise. Furthermore, Huang (2003) investigated the physiological effect of a 14-week qigong training program and found that participants had significant increases in distal skin temperature (DST) and distal blood flow ($p < .05$) after the intervention.

Researchers have also found that qigong improves (Li & Yeh, 2005) or helps to stabilize (Chen, Cheng, & Chang, 2004) emotional states. Feng and colleagues (2004) investigated the effects of qigong on participants’ relaxation and emotional control. The $\theta$, $\alpha$, and $\beta$ brainwaves of the qigong group participants showed significant changes postexercise ($p < .05$), indicating that qigong exercise helped relax the participants and had a positive influence on their emotions.

Although many studies have shown consistent results on the beneficial health effects of qigong, especially the improvement of cardiovascular function, very few authors have detailed what forms of qigong they used and how they used them. Also, there has been no scientific study on the health-promoting effects of qigong in wheelchair-bound older adults. In the study described here, we aimed to test the effects of qigong on the physiological (BP, HRV, and DST) and psychological health of wheelchair-bound older adults living in long-term care facilities in Taiwan.

**Material and Method**

**Design**

We used a quasi-experimental, pre–post test, nonequivalent control group design for this study. This design involved the collection of data over an extended period of time with multiple collection points before and after the introduction of an intervention (Polit & Hungler, 1995). The use of information from a control group with characteristics similar to the intervention group makes any inferences regarding the effects of the intervention more convincing because trends influenced by external factors would presumably be observed in both groups. For the present study, we recruited a convenience sample of wheelchair-bound older adults who lived in long-term care facilities to participate in a 12-week, 5 days/week ho-gong (a type of qigong) exercise program. We collected physiological and psychological data at baseline and in Weeks 4, 8, and 12 of the study.

**Participants**

After securing the approval of the hospital’s Institutional Review Board, we recruited 72 wheelchair-bound older adults from two long-term care facilities in the same urban area. The characteristics of these two facilities were similar; around 80% of their residents were wheelchair bound and depended on staff members to help them with activities of daily living. The inclusion criteria were that participants must (a) be 65 years old or older, (b) be cognitively intact as demonstrated by a score of 8 or more on the Short Portable Mental Status Questionnaire (SPMSQ; Pfeiffer, 1975), and (c) have had no regular exercise (e.g., qigong, tai chi, yuan chi, or yoga) in the past 3 months. We excluded those with severe cardiopulmonary or muscular malfunctions from the study. We explained the study purpose and procedures and secured written informed consent from participants. We assigned all participants from one facility to the qigong group ($n = 34$) and all participants in the other facility to the control group ($n = 38$). During the study period, six participants withdrew because of hospitalization or death, and a total of 66 participants (qigong group = 32; control group = 34) completed the study.

**Intervention**

Qigong master Lee (2007) introduced ho-gong, a type of qigong exercise, for wheelchair-bound older adults. Ho-gong is a combination of energy-building exercises as well as yi-ging-xi-suey gong (methods of adjusting the spine), yang sheng shu (methods of nourishing the vital principle), dao yin shu (methods of guiding and leading), and tu-na (methods of breathing control). Ho-gong is easy to learn and can be practiced anytime. It is particularly suitable for frail individuals who are unable to stand.

A trainer led participants in ho-gong daily, Monday through Friday, from 10 a.m. to 10:35 a.m., for 12 weeks in the lounge of the qigong-group facility. The room temperature was maintained at 24 ± 26°C. The ho-gong intervention included three phases: (a) warm-up (10 min), (b) ho-gong practice (20 min), and (c) cool-down (5 min). For the warm-up, the trainer led participants in relaxing their bodies and breathing with eyes closed while sitting quietly in their wheelchairs. After 5 min, they opened their eyes and gave themselves a light body massage. For the ho-gong practice, participants sat in the wheelchairs with hands relaxed on their laps. They gently clenched both fists and raised them slowly to chest height while inhaling. Then they exhaled, gradually relaxed their arms, and returned them to their laps (see Figure 1). For the cool-down, participants sat quietly with eyes closed and body relaxed to slow down their breathing.

![Figure 1. Ho-gong procedure.](Image)
The training team consisted of two trainers who were masters of qigong and had received at least 3 years of ho-gong training. One trainer served as an example in front of the group; the other trainer took attendance, corrected the participants’ posture, and oversaw the safety of the participants. The trainers constantly reminded participants to report any feelings of discomfort during the intervention (such as dizziness, cold sweats, etc.); no such feelings were reported during the 12-week program.

Control-group participants continued their usual care and daily activities; no additional exercise programs were administered.

**Data Collection**

We collected demographic data for group comparison as well as data on physical health (BP, HRV, DST) and psychological health (Brief Symptom Rating Scale-5) outcome variables from March to May 2008, as shown in Figure 2.

**Demographic data.** Through individual, structured, face-to-face interviews, we collected the following demographic data: age, gender, marital status, educational level, exercise habit, and number of chronic diseases. In addition, we administered the Barthel Index (BI) to understand the participants’ level of dependency in the activities of daily living. The BI included seven items (feeding, grooming, toileting, bathing, dressing, and bowel and bladder control) to assess self-care ability and three items (transfers, mobility, and climbing stairs) to detect activity capacity. Total score ranges from 0 to 100 (100 = totally independent; 91–99 = mildly dependent; 61–90 = moderately dependent; 21–60 = heavily dependent; 0–20 = totally dependent; Mahoney & Barthel, 1965).

**Physical health.** We measured participants’ BP using a digital sphygmomanometer (OMRON—HEM707, Rossmax Company, Japan) after participants had been resting, seated in their wheelchairs, for at least 15 min. We measured HRV using a portable machine manufactured by the DailyCare BioMedical, Inc. (Taiwan; model no. CMH 3.0). We instructed participants to sit in their wheelchairs and rest for at least 15 min, while the machine recorded their HRV. Finally, we measured DST on the left index finger using infrared temperature measuring equipment (Model: STS101-C, Omega Medical Corporation). The study technician calibrated these three instruments regularly. Their intraclass correlation coefficients (ICCs) ranged from .80 to .90.

**Psychological health.** We used the Brief Symptom Rating Scale-5 (BSRS-5) to assess the psychological health of the participants. The BSRS was modified from Derogatis’ Symptom Check List-90-Revised (SCL-90-R) by Lee (1997). The original version of the BSRS has 50 items, and it was further condensed to 5 items to produce the BSRS-5 (Lee, 1997). These five items cover anxiety, anger, depression, self-deprivation, and sleep disturbances. Participants rate the levels at which they are experiencing these five psychological symptoms on a scale from 0 to 4 (0 = not at all; 1 = a little bit; 2 = moderate; 3 = severe; 4 = extremely awful). We used the BSRS-5 instead of the longer instrument to avoid overwhelming the elderly participants with a long data-collection procedure. The BSRS-5 had a test–retest reliability of 0.82 in a group of 721 hospitalized patients and is highly correlated with the BSRS-50 (r = .87–.95; Lee, 1997). In this study sample, the ICC was .80.

**Data Analysis**

We used the Statistical Package for the Social Sciences (SPSS, Version 12.0, to analyze the data. We used descriptive statistics such as mean, standard deviation, range, and frequency distribution to describe participants in each group and the Pearson $r^2$ test or the Fisher’s exact $r$-test to test group differences in the demographic profiles. We used a mixed-design, two-way ANOVA to detect the variables for which time and group had interaction effects and performed one-way repeated measures ANOVAs to analyze the simple main effect of different time points in each group for those variables for which time and group had interaction effects. To further explore the group differences at Weeks 4, 8, and 12, we computed an analysis of covariance (ANCOVA) on those variables for which time and group had interaction effects using the pretest data as the covariate to offset the group differences at the beginning of the study. If the group differences were significant, we analyzed the Bonferroni post hoc tests after ANCOVA for the multiple comparisons (with total $n = .05$).

**Results**

**Participants’ Demographic Profiles**

Participants were mostly male (53.0%), with an average age of 75.5 ± 12.4 years. Most of them were married (54.6%), and their educational level was less than high school (92.4%). As per the inclusion criteria, none of them had regular exercise habits 3 months before the start of the study. Almost 70% (69.7%) of them had chronic illnesses, with an average number of chronic illnesses of 1.4 per person. The top three chronic illnesses they reported were hypertension (42.4%), diabetes mellitus (31.8%), and cerebrovascular accident (31.8%). The average BI score was 34.3 ± 28.1 for the qigong group and 37.7 ± 24.3 for the control group, meaning participants in both groups were heavily dependent on others for their activities of daily living. The demographic profiles of the participants in the two groups were similar, with no significant differences between them (see Table 1).

**Baseline Comparisons Between the Two Groups**

Using independent samples $t$-tests, we compared the baseline differences between the two groups on the outcome variables. As shown in Table 2, only DST was significantly different between the two groups ($t = 4.16, p < .001$).
Interaction Effects between Different Time Points and Different Groups

A mixed-design, two-way ANOVA indicated that there were significant interaction effects between four time points and two different groups for the following variables: systolic BP ($F = 39.59, p < .001$), diastolic BP ($F = 20.87, p < .001$), DST ($F = 72.74, p < .001$), and BSRS-5 ($F = 63.26, p < .001$). HRV was the only variable that showed nonsignificant interaction effects ($p > .05$).
Simple Main Effect of Different Time Points in Each Group

Systolic and diastolic BP, DST, and BSRS-5 score of the participants in the qigong group improved significantly over time during the course of the intervention (all \( p < .001 \); see Table 3). Further post hoc analysis showed that systolic BP and diastolic BP decreased significantly from pretest to the third posttest. DST gradually and significantly increased from pretest to the third posttest. Finally, BSRS-5 score significantly decreased over time, indicating a decrease in negative psychological symptoms in the qigong group participants (see Table 3).

While systolic BP, diastolic BP, and DST changed significantly in the control group as well, the changes were sporadic and varied in direction (see Table 4). At pretest, systolic BP of the control group participants was significantly higher than at posttest I; however, systolic BP at posttest II was also significantly higher than at posttest I, suggesting that there was no trend in the decrease of control group’s systolic BP. We found similarly unstable trends for diastolic BP and DST in the control group (see Table 4).

### Differences Between the Two Groups at Different Time Points

Results showed significant group differences at the first posttest (Week 4) in the following variables: systolic BP \( (F = 6.30, p = .015) \), DST \( (F = 31.98, p < .001) \), and BSRS-5 \( (F = 96.23, p < .001) \); see Table 5). These significant differences continued through the Weeks 8 and 12 posttests. Although diastolic BP did not differ significantly between the two groups at the Week 4 posttest \( (F = 2.07, p = .155) \), the differences were statistically different at the Weeks 8 and 12 posttests (see Table 5).

### Discussion

After 12 weeks of qigong training, wheelchair-bound older adults manifested significant improvements in BP, DST, and psychological health. Systolic and diastolic BP of participants decreased significantly after 12 weeks of qigong practice, consistent with the findings of Lee, Lee, et al. (2003) and Lee and colleagues (2004). In the present study, this positive effect started in Week 4 and increased over the remainder of the study period. Further, 10 out of 32 participants (31.3%) in the qigong group.
group had high BP (systolic BP > 140mm Hg; diastolic BP > 90 mm Hg), which was managed by regular medication. Our study supports the idea that qigong exercise can effectively decrease BP and thus might be used as an alternative way of managing hypertension to avoid possible complications from medications.

According to Lee and colleagues (2005), qigong practice can regulate the parasympathetic nervous system, stabilize the sympathetic nervous system, and eventually increase HRV. However, we found no interaction effects in this study. As Wang and Huang stated (2007), HRV can be easily influenced by the surrounding environment. In the present study setting, four to eight elders lived in one room, which might increase environmental stress from noise or interpersonal disturbances and confound the study results.

In addition, qigong group participants had a gradual and significant increase in DST throughout the 12-week study. Although we also found significant changes in DST in control group participants, the changes were sporadic and varied in direction. As the study progressed and the seasonal temperature increased, the qigong group participants exercised in air-conditioned rooms kept at 26–28°C, and each posttest was conducted in the same room. However, control group participants stayed in various rooms, and many of them did not turn on their air conditioners. This might account for the sporadic DST changes that occurred in the control participants during the study period.

Finally, the qigong participants showed a significant improvement in psychological health after 4 weeks of qigong practice, and the improvement increased over time. This result is similar to those of Feng and colleagues (2004) and Tsang, Mok, Au, and Chan (2003), and further verifies that qigong has a positive and regulating effect on psychological health.

Tables 3 and 4 present the differences among pretests and posttests in variables for which time and group had significant interaction effects in the qigong and control groups, respectively.

Table 3. Differences Among Pretests and Posttests in Variables for Which Time and Group had Significant Interaction Effects in the Qigong Group (n = 32)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pretest M (SD)</th>
<th>Posttest I M (SD)</th>
<th>Posttest II M (SD)</th>
<th>Posttest III M (SD)</th>
<th>F (p)</th>
<th>Post hoc a</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systolic BP (mm Hg)</td>
<td>135.3 (19.7)</td>
<td>119.5 (14.5)</td>
<td>112.7 (12.4)</td>
<td>104.8 (9.9)</td>
<td>86.75 (&lt;.001)*</td>
<td>Pre &gt; Post I</td>
</tr>
<tr>
<td>Diastolic BP (mm Hg)</td>
<td>73.8 (12.8)</td>
<td>70.4 (11.8)</td>
<td>65.0 (9.2)</td>
<td>59.3 (6.5)</td>
<td>31.39 (&lt;.001)*</td>
<td>Post I &gt; Post II</td>
</tr>
<tr>
<td>DST (°C)</td>
<td>31.9 (2.4)</td>
<td>34.4 (1.1)</td>
<td>35.1 (0.7)</td>
<td>36.0 (0.4)</td>
<td>78.06 (&lt;.001)*</td>
<td>Post II &gt; Post I</td>
</tr>
<tr>
<td>BSRS-5 score</td>
<td>7.0 (3.1)</td>
<td>3.9 (2.6)</td>
<td>2.2 (1.5)</td>
<td>1.1 (0.8)</td>
<td>103.63 (&lt;.001)*</td>
<td>Post III &gt; Post II</td>
</tr>
</tbody>
</table>

Note: Pretest = baseline; Posttest I = intervention Week 4; Posttest II = intervention Week 8; Posttest III = intervention Week 12; BP = blood pressure; BSRS-5 = Brief Symptom Rating Scale-5; DST = distal skin temperature; HRV = heart rate variability.  
a Bonferroni post hoc test.  
* p < .001.

Table 4. Differences Among Pretests and Posttests in Variables for Which Time and Group had Significant Interaction Effects in the Control Group (n = 34)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pretest M (SD)</th>
<th>Posttest I M (SD)</th>
<th>Posttest II M (SD)</th>
<th>Posttest III M (SD)</th>
<th>F (p)</th>
<th>Post hoc a</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systolic BP (mm Hg)</td>
<td>132.1 (24.5)</td>
<td>123.9 (14.6)</td>
<td>130.8 (21.9)</td>
<td>127.7 (23.3)</td>
<td>7.64 (.005)**</td>
<td>Pre &gt; Post I</td>
</tr>
<tr>
<td>Diastolic BP (mm Hg)</td>
<td>76.5 (11.3)</td>
<td>75.1 (11.2)</td>
<td>76.2 (10.6)</td>
<td>73.7 (10.4)</td>
<td>7.37 (&lt;.001)***</td>
<td>Post II &gt; Post I</td>
</tr>
<tr>
<td>DST (°C)</td>
<td>33.8 (1.2)</td>
<td>33.9 (1.0)</td>
<td>34.1 (1.0)</td>
<td>33.9 (0.9)</td>
<td>4.63 (0.014)</td>
<td>Post III &gt; Post II</td>
</tr>
<tr>
<td>BSRS-5 score</td>
<td>7.4 (1.9)</td>
<td>7.4 (1.9)</td>
<td>7.3 (1.8)</td>
<td>6.9 (1.4)</td>
<td>1.67 (.178)</td>
<td>n.s.</td>
</tr>
</tbody>
</table>

Note: Pretest = baseline; Posttest I = intervention Week 4; Posttest II = intervention Week 8; Posttest III = intervention Week 12; BP = blood pressure; BSRS-5 = Brief Symptom Rating Scale-5; DST = distal skin temperature; HRV = heart rate variability; n.s. = nonsignificant; – = Post hoc analysis was not performed due to nonsignificant F value.  
a Bonferroni post hoc test.  
* p < .05.  
** p < .01.  
*** p < .001.
longer the training and observation period has been, the greater the improvement in biological measures. It might thus be useful to monitor the long-term maintenance effects of qigong in wheelchair-bound elderly adults at 3–6 months. In addition, most studies on qigong have been quantitative. It might be useful to undertake a qualitative approach focusing on psychological issues to have in-depth understandings of feelings and reactions of this population to this type of intervention.

Our findings confirm that qigong exercise is suitable as a daily activity for wheelchair-bound elderly residents in long-term care facilities and may help them to manage high BP. Future research should examine whether qigong interventions could reduce the medication use for controlling high BP in wheelchair-bound elderly adults.

Acknowledgments
We would like to thank Feng-San Lee and Yueh-Ying Huang for their guidance in qigong, and Dr Kai-Sheng Hsieh of Veterans General Hospital, Kaohsiung, for his professional interpretation of heart rate variability. We would also like to thank the 72 wheelchair-bound older adults who participated in the study and the supervisors and staffs of the two long-term care facilities that served as the settings for their assistance in the process.

Declaration of Conflicting Interests
The author(s) declared no conflicts of interest with respect to the authorship and/or publication of this article.

Funding
This study was funded by the Veterans General Hospital, Kaohsiung, Taiwan (VGHKS 97-080).

Table 5. Between-Group Differences in Variables for Which Time and Group had Significant Interaction Effects at Weeks 4, 8, and 12 (N = 66)

<table>
<thead>
<tr>
<th>Variable/Time point</th>
<th>Q</th>
<th>C</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systolic BP (mm Hg)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Week 4</td>
<td>118.7</td>
<td>124.7</td>
<td>582.23</td>
<td>1</td>
<td>582.23</td>
<td>6.30</td>
<td>.015*</td>
</tr>
<tr>
<td>Week 8</td>
<td>111.5</td>
<td>132.0</td>
<td>6886.34</td>
<td>1</td>
<td>6886.34</td>
<td>110.31</td>
<td>&lt;.001**</td>
</tr>
<tr>
<td>Week 12</td>
<td>103.6</td>
<td>128.8</td>
<td>10416.19</td>
<td>1</td>
<td>10416.19</td>
<td>145.93</td>
<td>&lt;.001**</td>
</tr>
<tr>
<td>Diastolic BP (mm Hg)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Week 4</td>
<td>71.4</td>
<td>74.2</td>
<td>505.01</td>
<td>1</td>
<td>505.01</td>
<td>2.07</td>
<td>.155</td>
</tr>
<tr>
<td>Week 8</td>
<td>65.9</td>
<td>75.3</td>
<td>441.48</td>
<td>1</td>
<td>441.48</td>
<td>34.48</td>
<td>&lt;.001**</td>
</tr>
<tr>
<td>Week 12</td>
<td>60.0</td>
<td>73.0</td>
<td>900.50</td>
<td>1</td>
<td>900.50</td>
<td>81.54</td>
<td>&lt;.001**</td>
</tr>
<tr>
<td>DST</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Week 4</td>
<td>34.7</td>
<td>33.6</td>
<td>174.86</td>
<td>1</td>
<td>174.86</td>
<td>31.98</td>
<td>&lt;.001**</td>
</tr>
<tr>
<td>Week 8</td>
<td>35.4</td>
<td>33.8</td>
<td>395.10</td>
<td>1</td>
<td>395.10</td>
<td>263.34</td>
<td>&lt;.001**</td>
</tr>
<tr>
<td>Week 12</td>
<td>36.1</td>
<td>33.8</td>
<td>542.27</td>
<td>1</td>
<td>542.27</td>
<td>199.37</td>
<td>&lt;.001**</td>
</tr>
<tr>
<td>BSRS-5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Week 4</td>
<td>4.0</td>
<td>7.3</td>
<td>174.86</td>
<td>1</td>
<td>174.86</td>
<td>96.23</td>
<td>&lt;.001**</td>
</tr>
<tr>
<td>Week 8</td>
<td>2.3</td>
<td>7.2</td>
<td>395.10</td>
<td>1</td>
<td>395.10</td>
<td>263.34</td>
<td>&lt;.001**</td>
</tr>
<tr>
<td>Week 12</td>
<td>1.1</td>
<td>6.9</td>
<td>542.27</td>
<td>1</td>
<td>542.27</td>
<td>477.99</td>
<td>&lt;.001**</td>
</tr>
</tbody>
</table>

Table 5. Between-Group Differences in Variables for Which Time and Group had Significant Interaction Effects at Weeks 4, 8, and 12 (N = 66)

Note: Q, Qigong group; C, Control group; BP, Blood pressure; HRV, Heart rate variability; DST, Distal skin temperature; BSRS-5, Brief Symptom Rating Scale-5.

* p < .05.
** p < .001.

References


