

Mixed Methods Research

Qigong in Injured Military Service Members

A Feasibility Study

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Background: Wounded, ill, and injured (WII) Military Service members experience significant stress and are at risk for developing chronic conditions including posttraumatic stress disorder and depression. Qigong, a meditative movement practice, may positively affect their ability to engage in successful rehabilitation. **Purpose:** We assessed the feasibility of Qigong practice in WII Service members returning from combat; effects on stress, sleep, and somatic symptoms; satisfaction; and participants' experience with the practice. **Design:** Single-group, pre- and posttest, mixed methods approach. **Method:** Twenty-six WII were enrolled. The program was designed to include 20 classes over 10 weeks. Participants completed self-report questionnaires, practice logs, and an exit interview. **Findings:** Average attendance was 8.14 classes ($SD = 4.9$); mean engagement was 5.7 ($SD = 3.5$) weeks. Participants endorsed a high level of satisfaction with the practice. Qualitative themes included coping with stress; feeling more resilient and empowered; improvement in symptoms including sleep and physical function; and factors affecting practice. Participant-reported facilitators included accessibility and portability of the practice; barriers included scheduling conflicts and personal challenges. Participants recommended offering shorter programs with flexible scheduling options, increasing program awareness, and including significant others in future classes. **Conclusion:** Qigong was safe, portable, and easily adapted for WII Service members.

Keywords: *Qigong; stress; sleep; posttraumatic stress disorder; rehabilitation; complementary and integrative therapies*

Military service members returning from Iraq and Afghanistan are at risk for developing chronic conditions, including posttraumatic stress disorder (PTSD), substance abuse, and depression (Hoge, Auchterlonie, & Milliken, 2006). A significant number have polytrauma with associated symptoms of anxiety, nightmares, and pain (Capaldi, Guerrero, & Killgore,

2011; Gellis, Gehrman, Mavandadi, & Oslin, 2010). Those with combat experience report even higher stress levels and sleep disturbances (Lewis, Creamer, & Failla, 2009; Orff, Ayalon, & Drummond, 2009). Response to stress is characterized by a state of hyperarousal involving physiologic mechanisms known as the stress response (Esch, Fricchione, &

Stefano, 2003). When exposed to prolonged stress, negative emotional consequences can include sleeping difficulties, anxiety and associated somatic symptoms (Chow & Tsang, 2007).

Recent surveys of military service members returning from deployment found that sleep problems were prevalent (McLay, Klam, & Volkert, 2010) and may be related to behavioral and biological factors and the combat environment (Hoge, 2011; Lewis et al., 2009). Sleep disturbance is a significant concern as it exacerbates other symptoms and is often resistant to first-line treatment. Since stress is a pathogenic factor for chronic illness and can worsen symptoms including sleep problems, interventions that affect stress may have far reaching effects on various health conditions. Despite the high prevalence, treatment remains challenging and barriers exist to implementing comprehensive treatment models (Sayer et al., 2009; Yost & Taylor, 2013). Collaborative care models that include complementary therapy approaches may enhance treatment outcomes (Hoge, 2011; Office of the Army Surgeon General, 2010).

Qigong is a meditative movement practice consisting of four elements: breathing, meditation, gentle movement, and self-applied massage (Jahnke, Larkey, Rogers, Etnier, & Lin, 2010). The focus on elements of the mind (meditation, mindfulness), the body (posture, physical movement, massage), and the breath (slow, conscious) to attain a deeply relaxed state, all purported, according to the principles of traditional Chinese medicine, to enhance the vital "life forces" in the body (Chow & Tsang, 2007; Jahnke et al., 2010). Although the exact mechanism of action is not known (Z. Chen et al., 2013), the combination of these elements has been shown to stimulate a balanced release of neurohormones that promote a physiologic state of relaxation and reduce many of the physiological and psychological sequelae of traumatic stress (Jahnke et al., 2010; Yost & Taylor, 2013). Qigong was selected as the study intervention for its potential to reduce stress and

improve sleep and because it is accessible to people at all levels of ability. Furthermore, it may serve as a bridge between rehabilitation and resuming optimal levels of physical activity in injured military service members.

Literature Review

Qigong and Tai Chi share similar theoretical roots and practice components, therefore many research interventions incorporate blended aspects of these practices (Jahnke et al., 2010). Both promote relaxation and decrease sympathetic activity including lower levels of cortisol and adrenocorticotropin hormone (Abbott & Lavretsky, 2013). Although the applications of Qigong in chronic conditions are wide, the effects on reducing stress seem to be an underlying link (Ng & Tsang, 2009). Somatic symptoms may be exacerbated following trauma and their severity may be related to the intensity of the exposure. In a longitudinal study of Israeli veterans, those with higher levels of stress reactions reported higher somatization levels (Ginzburg & Solomon, 2011). Trauma exposures may also alter sleep-wake regulation mechanisms leading to persistent hyperarousal that contributes to insomnia (Capaldi et al., 2011).

Recent studies have supported the physical and psychological health benefits of Qigong practice (Abbott & Lavretsky, 2013; Rogers, Larkey, & Keller, 2010), including sleep problems (Abbott & Lavretsky, 2013; Lynch, Sawynok, Hiew, & Marcon, 2012), stress reduction (Hwang et al., 2013; Ng & Tsang, 2009), depression (Oh, Choi, Inamori, Rosenthal, & Yeung, 2013; Wang et al., 2013), anxiety and mood (Hui, Wan, Chan, & Yung, 2006; Johansson, Hassmen, & Jouper, 2008), somatic symptoms (Abbott & Lavretsky, 2013; Lee, Chen, & Yeh, 2006), and withdrawal symptoms (K.W. Chen, Comerford, Shinnick, & Ziedonis, 2010). Results of these studies are inconsistent and should be interpreted with caution because of the limited number of randomized

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controlled trials (RCTs) and those with a lack of an active or attention control group. Other methodological problems include small sample sizes and variations in practice styles, frequency, and study durations (Abbott & Lavretsky, 2013).

Although Qigong has been studied in various populations, no studies have been conducted to assess its health benefits in injured service members returning from Iraq and Afghanistan. It is important to first assess the feasibility of Qigong practice in this injured military population before conducting a larger studies to assess efficacy or effectiveness.

The purpose of this pilot study was to assess the feasibility of Qigong practice in service members returning from combat. The second aim was to evaluate participants' satisfaction with Qigong practice and describe their experiences so that the intervention could be improved. A third exploratory aim was to assess symptoms of stress, sleep, and somatization to provide preliminary data to support effectiveness.

Conceptual Framework

This study was guided by Benson's relaxation response (RR) model (Benson, 2000). The RR is a physiological state opposite to the stress response and is characterized by decreased arousal of the sympathetic nervous system and increased parasympathetic nervous system activity, resulting in homeostasis (Jacobs, 2001). The RR can be elicited when engaging in a repetitive mental or physical activity while at the same time passively ignoring distracting thoughts. It can be elicited by participating in Qigong, yoga, and different forms of meditation (Benson, 2000). The molecular pathways linked to the RR are similar to those observed in the stress response (Esch et al., 2003), but the RR counteracts the activity of norepinephrine and cortisol and results in other biochemical changes including decreased blood pressure and increased heart rate variability (Bhasin et al., 2013; Galvin, Benson, Deckro, Fricchione, & Dusek, 2006).

Method

Design

A single-group, pre- and postintervention, mixed-methods design was conducted to assess the feasibility

of service members' participation in Jahnke's Integral Qigong method. Qualitative exit interviews were conducted to identify patient experiences with and ways to improve the delivery of the Qigong intervention. Participants completed six self-administered questionnaires at baseline and postintervention; and weekly practice logs throughout the program. A qualitative approach using content analysis was used to assess participants' overall experience with Qigong practice. This convergent parallel mixed methods design was used to gain a better understanding of feasibility and participants' experience since both quantitative and qualitative data provide different types of information to understand the impact of an intervention (Creswell, 2014).

Participants: Eligibility and Recruitment

The target population in this study was military service members who returned from Iraq and Afghanistan seeking treatment for physical or psychological injuries sustained during deployment. A convenience sample was recruited from a large East Coast military treatment facility, by using flyers, setting up recruitment tables in key clinics, and presenting briefings to health care providers from March 1, 2010, through April 30, 2011.

Eligibility criteria included ability to participate in the full 10-week intervention; a return from deployment within 12 months; a score of 13 or greater on the Mini-Mental Status Exam-2: Brief Version; and Level 7 on the Rancho Los Amigos Level of Cognitive Functioning Scale for those with traumatic brain injury (TBI). Exclusion criteria included active psychoses, significant cognitive limitations, blindness, bilateral upper extremity amputations, and current practice of Qigong or Tai Chi. Eligibility was assessed by a nurse practitioner (associate investigator) based on medical record review, patient interview, and score on the Mini-Mental Status Exam-2: Brief Version. Potential participants meeting eligibility criteria were invited to join the study, and if interested, were presented with full written informed consent. Consented participants completed a demographic form and the Brief Symptom Inventory-18 and were assigned a unique study ID number.

The study's sample size was determined based on recommendations by Hertzog (2008). For single group pilot studies, a sample size of 20 to 25 is recommended

to meet feasibility study objectives (Thabane et al., 2010). The researchers attempted to enroll 40 participants, assuming a potential of 25% attrition, to obtain a target number of 30 completing posttest measures.

Aims and Measures

Baseline questionnaires were completed within 1 week prior to the first class. Two forms were developed based on a review of literature to describe the sample: (a) The personal data form containing self-reported demographics, military status, deployment information, and treatment status; and (b) the clinical data form, containing medical history, injuries, symptoms, medications, and specialty clinics attended. Participants completed the personal data form; a nurse practitioner completed the clinical data forms based on chart review. All other measures completed at baseline and postintervention are shown in Table 1.

Aim 1: Feasibility was assessed by recruitment rate defined by (a) the number of persons who expressed interest during the screening period, (b) the number who declined, (c) the number of participants enrolled/month, and (d) total number enrolled. Dropouts included the number who dropped out after enrolling in the study, regardless if by choice or due to uncontrollable circumstances. Adherence was assessed by the number of classes attended weekly and the number of self-reported Qigong practice sessions reported on personal logs. "Completers" were defined as those who attended at least 85% of the scheduled classes.

Aim 2: Satisfaction with practice was defined as participants' scores on the Client Satisfaction Questionnaire (CSQ). We also assessed experience with Qigong based on exit interview responses, participant communications, and responses to open ended questions on the practice log: "During this week what have you noticed for better or worse?" Other questions included perceptions regarding frequency of classes, program duration, and suggestions for improvement. These data were analyzed to gain feedback for improving the intervention and to find ways to make it more feasible in this population.

Aim 3: For the exploratory aim, stress, sleep, and somatic symptoms were assessed to explore preliminary data to support effectiveness and evaluate effect sizes.

Procedures

The study was approved by the Institutional Review Board of the medical center. Interested patients were given a study flyer and contacted by a research team member. Baseline questionnaires were completed within 1 week prior to the first class and again at postintervention (see Table 1). Participants were asked to attend 1-hour Qigong classes, twice a week for 10 weeks; to practice outside of class for 15 to 20 minutes a day; and to record their practice and any adverse events on practice logs.

Qigong Intervention

The style of Qigong used in this study was *Integral Qigong*, developed by Roger Jahnke (1997, 2002). Integral Qigong includes four categories of practice: breath practices, gentle movement, self-applied massage, and meditation (Table 2). Participants were introduced to Qigong using the four movements of the Vitality Method (Jahnke, 1997) and then learned the Nine Phases, movements that are designed to facilitate the cultivation of energy (Jahnke, 2002). Each class began with a short "check-in" and a warm-up phase followed by 30 to 40 minutes of selections from the four categories. The instructor demonstrated variations for performing movements sitting, standing, or lying down, and emphasized practicing with a mindful attitude rather than performing the movements perfectly. The movement aspect of the practice was desirable because a predominantly quiet sitting meditation practice may be challenging for people with anxiety and severe depression (Benedict, Mancini, & Gordin, 2009). Qigong's portability was also an advantage as it could be performed anywhere, for example, standing in formation or waiting for an appointment.

A nationally certified Qigong instructor with experience in adapting the practice for persons with injuries delivered the intervention. A fidelity checklist modeled after the work of Waltz et al. (1993) was used to evaluate inclusion of the four categories of practice, emphasizing instruction on correct body

Table 1. Instruments and Psychometric Properties

Construct	Instrument	Description/Psychometrics	Format	Cronbach's Alpha
Cognitive function	Mini-Mental Status Exam-2; Brief Version (MMSE-2:BV)	Assesses registration, recall, orientation to time and place (Folstein, Folstein, & McHugh, 1975).	16 items; dichotomous scoring (0 = <i>incorrect</i> ; 1 = <i>correct</i>)	n/a
Psychological distress	Brief Symptom Inventory (BSI-18)	Contains anxiety, depression, and somatization subscales. Correlates highly with scales on the Symptom Checklist (SCL-90-R; $r = .93$); adequate convergent-discriminant validity has been reported (Derogatis, 2000).	18 items; 4 -point Likert-type scale	.87
Expectations about benefit from therapy	Credibility-Expectancy Questionnaire (CEQ)	Includes three credibility items and one expectancy item (Borkovec & Mathews, 1988; Borkovec, Newman, Pincus, & Lytle, 2002). Two open-ended questions added to assess expectations of benefit. The CEQ demonstrates high internal consistency (standardized α of .84-.85 for the scale); and test-retest reliability ($r = .83$; Devilly & Borkovec, 2000).	Credibility items: 1-9 Likert-type scale; Expectancy item: 0% to 100% scale	.83
Perceived stress	Perceived Stress Scale (PSS-10)	Self-report measure of psychological stress (Banerjee et al., 2007). Cronbach's $\alpha = .89$ in college students; evidence of convergent validity based on high correlation with State-Trait Anxiety Inventory ($r = .87$; Roberti, Harrington, & Storch, 2006).	10 items; 0-4-point Likert-type (range 0-40); higher scores reflect greater stress	.87
Somatic symptoms	Patient Health Questionnaire-15 (PHQ-15)	Eight items address regional pain and seven general physical discomfort. Cronbach's $\alpha = .80$ in primary care samples. Evidence of convergent validity based on strong associations between scores and functional status, disability days, and symptom difficulty (Kroenke, Spitzer, & Williams, 2002).	15 items; 2-point Likert-type scale	.71
Sleep	Pittsburgh Sleep Quality Index (PSQI)	Seven component scores (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989). Cronbach's $\alpha = .83$ in studies of healthy, depressed, and sleep disorder patients. Validity was established by its ability to discriminate patients with depression and other sleep disorders from controls (Buysse et al., 1989) and groups with and without insomnia in outpatients with TBI attending a neurorehabilitation program ($t = 12.7, p < .001$).	19 items; 3-point Likert-type scale (higher scores reflect worse sleep quality)	.75
Satisfaction with services	Client Satisfaction Questionnaire-8 (CSQ-8)	Assesses satisfaction with services in a variety of treatment settings. The alpha coefficients range from .92 to .93 in mental health outpatients (Larsen, Attkisson, Hargreaves, & Nguyen, 1979). Evidence of construct validity based on correlations of therapists' estimates of client satisfaction ($r = .56$; Larsen et al., 1979) and findings relating satisfaction to measures of service utilization ($r = .57$ and $.56$; Larsen et al., 1979).	8 items; 4-point Likert-type scale	.88
Experience with program	Structured Interview guide (IG)	Interview questions about participant's experience with Qigong program; perceived benefits and barriers.	10 open-ended questions	n/a

Table 2. Integral Qigong: The Four Categories of Practice

Category	Specific Practices/Forms ^a	Benefits
Breath; 5-10 minutes	<ul style="list-style-type: none"> • “Essential” breath • “Remembering” breath • Sigh of relief • In, in, out breath • Warrior’s breath 	Relaxation, increase lung capacity, complete exhalation of stagnant breath (qi), circulation of lymph
Movement; 15-25 minutes	Warm ups The vitality method: <ul style="list-style-type: none"> • Natural flow • Side to side bending—spine • Front to back bending—spine • Supporting heaven The nine phases: <ul style="list-style-type: none"> • 3 body-focused • 3 heart-mind focused • 3 spirit-focused 	Increase circulation to joints and muscles, relaxation, improve balance, increase strength and flexibility of spine, circulation of lymph, strengthen lower legs <ul style="list-style-type: none"> • Relieve pain, heal disease, maximize energy • Stabilize thoughts and emotions • Be and express one’s highest self
Self-applied massage; 10-15 minutes	<ul style="list-style-type: none"> • Reflex points (ears, hands, feet) • Neck and shoulders • Body tapping • Tracing the channels 	Distant effects: Stimulate related organs Local effects: Relieve tension, increase circulation, propel lymph, remove lactic acid and metabolic waste products
Meditation; 5-10 minutes	<ul style="list-style-type: none"> • Seated • Walking • Standing 	Foundation for spiritual practice; increase awareness, integration of mind–body–spirit

Note: Based on information from *The Healer Within* (Jahnke, 1997) and *The Healing Promise of Qi* (Jahnke, 2002).

^aAt each class, practices or forms were selected based on group interest, energy, and time available.

alignment, a focus on conscious breathing, a quiet mind, and returning to the present moment. The curriculum and fidelity checklist were reviewed by a Qigong master, Dr. Roger Jahnke, OMD. To ensure consistent delivery, 25% of randomly selected class audiotapes were evaluated by an outside instructor.

Analysis

All data were entered into SPSS version 20 with a quality check completed on 25% of entries. Formal data analysis employed R software (R Core Team, 2012). Descriptive statistics were conducted to describe the sample at baseline. Feasibility measures were descriptively summarized. All reported *p* values were based on two-tailed hypotheses. Means, standard deviations, and ranges for attendance, missed classes, practice logs, and use of Qigong skills were calculated. Frequencies of independent practice sessions were calculated including average number of returned logs, number of practice sessions per week, and number of days using Qigong skills. Paired-samples *t* tests were planned to compare mean

symptom scores at baseline to postintervention. In computing the overall score for instruments, if at least 80% of the items were completed, we took the average as the overall score for the participant. Otherwise the overall score for that participant was considered missing. Effect sizes were estimated using Cohen’s *d* corresponding to the mean changes in outcome variables from baseline to 12 weeks in units of standard deviation.

Qualitative data were analyzed independently by three team members using conventional content analysis with an inductive approach (Elo & Kyngas, 2007; Hsieh & Shannon, 2005). Content analysis involved generating codes or key phrases from the data; identifying patterns and themes; and organizing the descriptive summary in a way that best fit the data (Sandelowski, 2000). Several readings of transcripts were done to get a sense of the whole, followed by open coding, and generation of preliminary categories. Ethnograph Version 6.0 (Qualis Research Associates) was used to code key segments of text and record memos and exemplar quotes. Tables of key words and their frequencies were generated to

assist in developing the subcategories and themes. Preliminary categories and quotes were entered in a table to help organize the data. The team members met several times to refine the themes and subcategories that best described the participants' experience and to resolve discrepancies. The quantitative and qualitative findings were compared where applicable.

Results

Participants

Due to the low accrual rate, it was not feasible to enroll participants into defined cohorts as planned. Some interested patients were not eligible as their length of time since deployment was greater than 12 months. Therefore, the protocol was amended to allow for rolling enrollment with no restriction on time since deployment. With rolling enrollment, participants joined an ongoing class after completing a one-on-one orientation with the instructor.

Twenty-six outpatients were enrolled (20 males, 6 females) ranging in age from 20 to 53 years ($\bar{x} = 35$, $SD = 9.3$; see Table 3). The majority were active duty army personnel. The most common diagnoses based on medical record review included mental health conditions, orthopedic, soft tissue, and head injuries. The most common symptoms based on self-report and record review included sleep difficulties ($n = 22$), pain ($n = 22$), problems with concentration ($n = 13$), and memory ($n = 12$). The most common medications included analgesic nonopioids ($n = 18$), antidepressants ($n = 16$), anticonvulsants ($n = 11$), antipsychotics ($n = 8$), opioids ($n = 7$), sedative hypnotics ($n = 7$), and anxiolytics/benzodiazepines ($n = 4$).

Based on the Brief Symptom Inventory-18, 61.5% of the participants suffered from psychological distress. The mean subscale scores were 4.8 ($SD = 3.4$) for somatization; 5.8 ($SD = 5.7$) depression, and 6.1 ($SD = 5.9$) for anxiety. The mean Global Severity Index score was 16.8 ($SD = 13.3$). Three participants endorsed having "thoughts of ending your life" and underwent further assessment but remained eligible for the study. Seventeen participants completed the Credibility/Expectancy Questionnaire and the mean credibility score was 18.52 ($SD = 4.2$); the mean expectancy score ($n=16$) was 53.75 ($SD = 25.78$). Most participants who completed the Credibility/Expectancy Questionnaire hoped that Qigong would help them

Table 3. Demographics

Variable (Range)	Response	<i>M</i> (<i>SD</i>)
Age (20-53)	Years	35 (9.3)
Length of time in theatre (1-37.5)	Months	6.7 (7.7)
Variable		<i>n</i> (%)
Gender	Male	20 (77)
	Female	6 (23)
Race/ethnicity	Hispanic	5 (20)
	White	15 (60)
	Black/African American	4 (16)
	Other	1 (4)
Education	High school	5 (19)
	Some college	6 (23)
	College degree (AA or BS)	12 (46)
	Graduate/professional degree	3 (12)
Marital status	Single/never married	5 (19)
	Married	14 (54)
	Divorced	3 (11.5)
	Separated	3 (11.5)
	Unmarried living with partner	1 (4)
Participation in mind-body therapies	Yes	11 (42)
	No	15 (58)
Branch of service	Army	25 (96)
	Marine Corp	1 (4)
Military status	Active duty	14 (54)
	Reserve	6 (23)
	National Guard	6 (23)
Military rank	Enlisted 1-4	14 (54)
	Enlisted 5-6	3 (12)
	Enlisted 7-9	4 (15)
	Officer/Warrant officer	5 (19)
Deployment location	Iraq	10 (38)
	Afghanistan	13 (50)
	Other	3 (12)

with stress-related symptoms, physical function, and relaxation techniques.

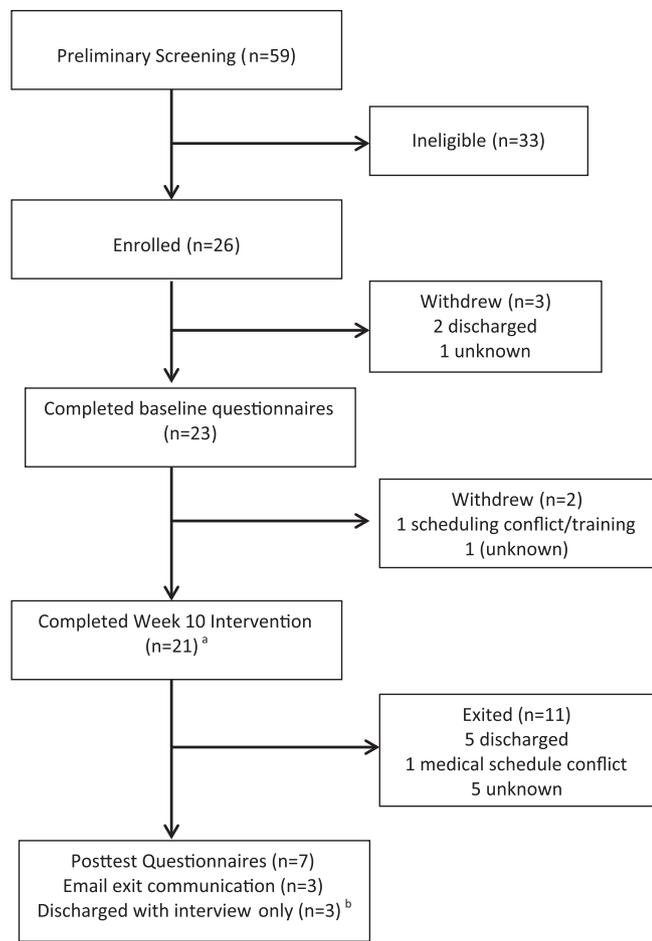


Figure 1. Flow Diagram

^aAttended one or more classes. ^bParticipants exited due to discharge but provided exit interview.

Feasibility

Recruitment. Approximately 532 contacts were made at recruitment tables. Two hundred eighty-one contacts (52.8%) declined; reasons included “No interest” (35.6%), “Would not be at facility long enough” (22.4%), “No time” (20.9%), “Self-identified as not eligible” (13.1%), “Can’t stand or keep balance” (6.4%), and “Already enrolled in the study” (1.4%). One hundred sixty-three contacts (including staff, family members) may have taken a flyer but did not engage in conversation about the study. Eighty-eight contacts requested follow-up information or screening. Fifty-nine contacts were screened, 33 were not eligible, and 26 were enrolled (Figure 1). The overall accrual rate was 2.2 participants per month.

Dropouts. Of the 26 enrolled participants, 16 dropped out after enrollment: 5 dropped before attending any

classes and 11 during the intervention. Of the 16 who dropped, 9 (56%) dropped out for uncontrollable reasons such as schedule conflicts ($n=2$) or discharge from the facility ($n=7$). Seven participants dropped for unknown reasons.

Adherence and Class Attendance. Participants attended an average of 8.14 ($SD = 4.9$) out of 20 classes during an average of 5.71 ($SD = 3.5$) weeks out of a possible of 10 weeks. Overall attendance rate was 41.2% ($SD = 25.3\%$). Women ($n = 6$) attended an average of 13 classes ($SD = 4.5$) and men ($n = 20$) 6.6 classes ($SD = 4.14$). Reasons for missed classes and respective frequency of reporting included scheduling conflicts ($n = 19$, 43.2%), surgery/illness ($n = 8$, 18.1%), vacation/holiday ($n = 5$, 11.4%), and unknown ($n = 12$, 27.3%). Only two participants completed at least 85% of the scheduled classes. Despite missing classes, 10 (47.6%) of those who attended one or more classes remained engaged in the program by returning after surgery or other illnesses. For analysis purposes, we redefined “completers” as those who “remained engaged” and provided exit data. These 10 “completers” attended an average of 17 classes (range 13-20).

Qigong Independent Practice. Eleven participants (52.3%) documented their independent practice using weekly logs. The mean number of practice sessions was computed by dividing the overall total number of practice sessions by 11 resulting in 17.09 ($SD = 13.90$) practice sessions. We then averaged this number to get the overall mean number of practice sessions per week per person. Based on the number of weeks that each person engaged in the program ($M = 6.12$ weeks, $SD = 2.72$), the overall mean number of practice sessions per week per person was 2.89 ($SD = 1.8$) with an average session duration of 15.84 minutes ($SD = 12.42$). Based on the number of weeks ($M = 4.45$ weeks, $SD = 3.3$) that we have documentation for Qigong skills usage records, 11 participants reported using Qigong skills an average of 3.09 days/week ($SD = 2.23$).

Exit Data. Of the 21 participants who attended classes, 10 (47.6%) completed formal exit data. Three participants provided detailed follow-up emails or phone texts and three provided phone communications. Five provided no data.

Table 4. Pre- and Postintervention Mean Scores for Outcome Variables

Variable	Pre Scores			Post Scores			Difference (<i>d</i>)			Paired <i>t</i> Test			95% CI		Effect Size ^a
	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	Statistic	<i>df</i>	<i>p</i> value	Lower	Upper	
PSS	23	20.09	6.6	7	16.14	4.38	7	-4.14	9.10	-1.21	6	.274	-12.56	4.27	.46
PHQ	21	11.00	4.44	7	8.14	3.58	7	-3.57	5.78	-1.64	6	.153	-8.91	1.76	.62
PSQI	22	10.27	4.44	7	8.43	2.15	7	-2.00	4.69	-1.13	6	.302	-6.34	2.34	.43

Note: PSS = Perceived Stress Scale; PHQ = Patient Health Questionnaire; PSQI = Pittsburgh Sleep Quality Index; CI = confidence interval; *df* = degrees of freedom.

^aThe effect size for paired *t* test is computed as $|\text{mean}.d|/(SD.d)$.

Satisfaction. Seven participants completed the CSQ at follow-up. The mean score was 27.28 (*SD* = 3.03; range 8-32) indicating a high level of satisfaction with the program. High ratings were endorsed for the items “quality of classes” (*M* = 3.7, *SD* = 0.48) and overall satisfaction with the program (*M* = 3.57, *SD* = 0.53).

Stress, Sleep, and Somatic Symptoms. Table 4 reports means and standard deviations for symptoms at pre- and posttest. Effect sizes were moderate for stress (.46), sleep (.43), and somatic symptoms (.62). We emphasize that the study was not powered to detect significant differences and larger studies are needed to provide definitive data. No serious adverse events were reported.

Qualitative Analysis and Findings

Analysis of participants’ experience with Qigong practice was based on data from 16 participants, including exit interviews (*n* = 10; Table 5), detailed e-mails/text messages, and/or phone calls (*n* = 4), other communications (*n* = 4), responses to the question on the practice log (9 participants logged 28 responses), and responses to open-ended questions on the CSQ (*n* = 5). Some participants provided more than one form of data. Data from six participants who dropped out were included in this analysis. Four recurrent themes emerged from the data: (a) Coping with Stress; (b) Feeling More Resilient and Empowered; (c) Improvement in Symptoms; and (d) Factors Affecting Qigong Practice.

Theme 1: Coping With Stress

All participants reported decreased stress with Qigong practice and often used Qigong skills to manage

stress. Everyone indicated that practicing Qigong was relaxing and participants reported feeling “relaxed” (*n* = 39), “calm” (*n* = 18), “peaceful” (*n* = 7), as well as occasionally “soothing” and “less anxious.” In exit interviews, participants commented that Qigong “helped me slow down.” A few participants observed that these feelings extended beyond the immediate practice period and seemed to affect their relationships. For example one participant said:

The general stress level of my house is lessening . . . there is more laughter and spontaneous joy in my days.

Three participants described their experiences using Qigong breathing exercises to help them deal with stressful situations:

A couple of minutes here and there, breathing, centering. . . . I’m catching myself [practicing] while I’m convalescing. . . . I don’t want to take drugs. . . . I’m all for Qigong.

Before I used to get irritated easily and now. . . . I’m more calm . . . more centered within myself.

Theme 2: Feeling More Resilient and Empowered

Patients in rehabilitation typically face adjustments to significant life changes and the potential loss of their military careers. Five participants reported feeling overwhelmed and having difficulty managing symptoms prior to the intervention. One study participant reported improved self-confidence with practice:

Before the program my world felt like it was spinning out of control without hope for my ability to

Table 5. Exit Interview Questions

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1. In general, please describe your overall experience with Qigong practice.
 - a What did you like about the classes?
 - b What did you dislike about the classes?
 2. Please describe any difficulties you may have experienced in attending the classes.
 3. What if anything would have made it easier for you to attend the classes?
 4. Please describe your experience with practicing Qigong outside of class.
 5. What if anything would have made it easier for you to practice outside of class?
 6. Please describe any changes in how you feel since you have been practicing Qigong.
 7. Please describe any changes in your symptoms since you have been practicing Qigong.
 - For example, thinking back to the symptoms you had prior to starting Qigong or those you may be currently experiencing.
 8. Can you think of any ways that Qigong practice may be helpful to you in the future?
 - If yes, please describe.
 9. What suggestions do you have for making the Qigong classes better?
 10. What other comments or suggestions would you like to share about the Qigong program?
-

effect change. Slowly over the last weeks as I have mastered Qigong, I find my self-esteem is rising and my overall well-being improved . . . successfully struggling with the [Qigong] practice gives [me] confidence that [I] can be successful in general.

Some participants used Qigong skills to manage substance use and anger. For example, one participant going through a difficult divorce reported changing his usual pattern of coping after an argument with his wife:

Normally, I would head straight to the liquor store, but this time I settled into my body, watched my breathing, felt myself calming down . . . without a drink.

Another participant voiced having problems with “road rage” and commented:

Friday morning [when] I became very angry, I sat in the car and aligned [my body] . . . and controlled relaxed breathing actually helped. Wow.

Several participants reported feeling stronger and better able to deal with life’s challenges, for example: “[I] woke grumpy and drained . . . by end of routine felt able to meet the day,” and “Things haven’t gotten easier, but I’ve been able to withstand more.”

Feeling more resilient and empowered suggests that Qigong practice may support WII as they deal with multiple losses and challenges.

Theme 3: Improvement in Symptoms

Six participants noticed connections between practice and how they felt, some as early as the second week of the program. Three participants reported better “mood,” two reported less anxiety, one reported improvement in depression. For example:

I do it [Qigong] toward the end of the day . . . before that I used to go to sleep and . . . would wake up mad . . . [now] I wake up with a better mood.

Several participants reported that they were dealing with memory and concentration problems. Five participants reported improvements in mental clarity and focus ($n = 13$ practice log comments). One participant reported “ups and downs” with practice but overall found the practice helpful:

[My] mind is clear; [I have] better focus when reading; and [this week] I did very well focusing in school.

Overall, six participants reported improvements in sleep. Four commented that their sleep was more restful and they felt less tired during the day. Two participants reported using Qigong breathing to help them fall asleep:

I found doing the breathing right before sleep was very helpful . . . it was taking me like half an hour to 45 minutes to fall asleep where now I can fall asleep in 10 to 15 minutes.

Three participants noted that Qigong practice helped relieve pain, including headaches, postoperative

pain, and muscle tension. One participant with TBI commented, “I know for certain while I was attending classes the headaches would even go away.” Another participant described improvements in jaw clenching:

During the course of the day . . . holding my jaw in a way that wasn’t grinding, but it was gripping . . . that would bring [a] headache . . . so I’m not doing those sort of habit behaviors . . . now the first response is to try to breathe.

Several participants reported improvements in physical function, including balance ($n = 3$), flexibility ($n = 2$), walking ($n = 1$), and range of motion ($n = 1$). A participant with TBI and another with pain reported improvements in balance and postoperative pain:

. . . at first I couldn’t do [Qigong] except in the chair and then eventually I was able to do it [Qigong] standing . . . they [physical therapists] were pretty impressed with how quickly I was able to improve my balance.

[The Qigong] I learned to help with post-op pain and movement was awesome . . . my range of movement dramatically improved.

Theme 4: Factors Affecting Practice

Many participants discussed barriers and facilitators to their Qigong practice. Barriers included scheduling conflicts and personal challenges such as decreased motivation, not feeling confident with the “moves” initially, and preference for a more active practice. Maintaining motivation to change behavior is challenging in the context of recovering from complex injuries. For example:

I have a penetrating traumatic brain injury . . . it was hard to motivate myself to do anything . . . but I did schedule my (medical) appointments around Qigong.

One participant with balance issues and two others with leg prostheses expressed frustration initially when they were only able to practice while sitting.

Participants described facilitators such as Qigong’s accessibility and portability. Several participants described their ability to adapt the practice even in the early stages of rehabilitation; sometimes practicing sitting, standing, or lying down.

I found it challenging, but not so hard that I couldn’t do it . . . especially considering how close to my injury it was . . . this was something I was able to pick up and start doing right away.

Many participants described the ease with which Qigong skills can be practiced in any setting, and reported using conscious breathing, body alignment, and self-massage of hands:

It’s nice you can do it anywhere. . . . I loaded it on my phone. . . . I loaded it on my iPads. . . . I can take it with me everywhere . . . waiting for an appointment . . . self-massage of the hands . . . do remembering breath.

Some participants liked that Qigong combines movement with meditation:

. . . the physical movement of it made it ok to get into the guided breathing part of it. . . . I gravitated towards some of the more robust end of it, which slowed me down enough so that now I can do some of the more slow pieces of it.

Other suggestions were in the areas of class scheduling and program awareness. Participants preferred a shorter program with more flexible scheduling including options for drop-in classes. Some suggested having a Qigong video loop running in clinic waiting rooms and offering a T-shirt to advertise the program. Others suggested including family members or significant others in the classes to increase motivation to participate.

Discussion

The purpose of this pilot study was to assess the feasibility of Qigong practice in injured service members returning from combat. Although many potential participants expressed initial interest during recruitment activities, several reported that they were too busy, unwilling to commit to a 10-week study, or assumed that they would not be available for the study duration. The setting of an acute care medical center was not conducive for this study as the population was transient and dealing with rehabilitation issues which were frequently beyond the participants’ control. Generally, participants missed classes or exited early due to conflicting demands on their time such as medical appointments, surgeries, work/intern-

ships, and discharge from the facility. Participants who were discharged usually returned to their homes or local rehabilitation facility and therefore were no longer able to attend classes. The length of time to recruit the sample and the low completion rates suggest that the study was not feasible as designed and implemented. Lack of familiarity with Qigong also seemed to impede recruitment efforts. Future studies should consider changing the name to communicate the nature of the practice, for example, “mind–body movement program” or similar wording.

The second aim was to evaluate participants’ satisfaction and experience with Qigong practice. Participants who remained engaged in the program endorsed a high level of satisfaction. This finding must be interpreted with caution since we have limited follow-up data and dissatisfied participants are more likely to drop out (Larsen et al., 1979). Although only seven participants completed the CSQ, qualitative data from both “completers” and those who dropped out provided additional support for satisfaction. Although several participants dropped out for various reasons, some of them provided exit data and planned to continue the practice after the program ended.

Participants reported both psychological and physical health benefits, including feeling more focused and less irritable. The majority reported improvements in stress and use of Qigong skills to manage stressful situations. Some noted that Qigong practice positively affected their relationships. Some participants reported improvements in sleep quality and somatic symptoms. These findings are consistent with research supporting improvement in mood and reductions in stress, anxiety, depression, and anger with Qigong practice (Jahnke et al., 2010; Johansson et al., 2008; Tsang, Fung, Chan, Lee, & Chan, 2006) and improvements in self-esteem as well as decreased anger and anxiety in patients with TBI (Blake & Batson, 2009; Yost & Taylor, 2013). Reports of decreased anger in this study are promising since anger is a common problem in WII and in those with PTSD. These findings may have implications for introducing Qigong practice to help with anger and related symptoms in WII receiving specialty treatment for PTSD or TBI at a Veterans hospital or other rehabilitation setting. Improvements in sleep quality were consistent with research findings in perimenopausal women (Yeh & Chang, 2012), adults with fibromyalgia (Lynch et al., 2012), and older adults (Wu, Kwong, Lan, & Jiang, 2015). Improvements in sleep and pain in the current study

are promising for potential treatment interventions since these problems affect patients’ ability to engage in treatment (Sayer et al., 2009).

Several participants noted improvements in flexibility, strength, and balance with Qigong practice. Other studies support significant improvements in physical function, functional mobility, and balance mechanisms with Qigong and Tai Chi practice (Jahnke et al., 2010; Jones et al., 2012; Rogers et al., 2010; Yang, 2007). An increased sense of empowerment in WII in this study is supported by a recent qualitative study of six military service members attending a rehabilitation program for mild TBI. These researchers identified the theme “regaining control,” citing examples of how participants used Qigong to manage anxiety, anger, flashbacks, and chronic headaches (Yost & Taylor, 2013).

The third exploratory aim provided effect sizes that should be interpreted with caution since estimates from small samples are positively biased and imprecise (Hertzog, 2008). Future studies with larger and more homogeneous samples will help to improve the reliability of these estimates. Although the quantitative data were very limited, the qualitative data provided support for improvements in stress, sleep, and somatic symptoms.

The high dropout rate may suggest that participants were dealing with complex injuries and many competing priorities associated with rehabilitation. The type and timing of the intervention in relationship to phase of rehabilitation should be considered in designing future studies. Shorter interventions with more flexible class offerings and offering the program during the later phase of rehabilitation when acute therapies are completed should be considered. Including a coaching component for Qigong independent practice may help with compliance. Considering that some participants reported problems with motivation and concentration, including significant others in the classes may also increase compliance. The majority of participants experienced psychological distress at baseline and several were taking psychotropic medications, which may have affected attendance and compliance with practice. Although only limited numbers of females enrolled, women had greater overall attendance than men. Targeting enrollment of female WII warrants further study. Higher education was also associated with attendance ($p = .048$) based on Pearson’s chi-square test. We emphasize that affirmative conclusions cannot

be drawn given the small sample size and lack of adjustment for multiple comparisons. Future studies should consider the range of mind–body practices that offer portability and can be adapted to WII's preferences and capabilities.

Since only seven participants completed the postquestionnaire data, we were not able to integrate the quantitative and the qualitative data findings as originally intended. Since there was no control group, non-specific factors such as socializing with others, instructor support, and concurrent therapies may have contributed to the beneficial effects reported. Future studies that include a standard control and an attention control arm would help to control for the nonspecific elements of the intervention (Schnurr, 2007; Thabane et al., 2010). Self-report data for assessing adherence to home practice has limitations; more objective measures would help to insure reliability (Wahbeh, Zwickey, & Oken, 2011). The use of mobile prompting, activity trackers and data collection devices may facilitate compliance with study requirements. The reliability coefficients for the PSQI and PHQ were less than .80 in our sample. Both questionnaires require that participants assess symptom experience over the past month, which may have been challenging based on self-reports of memory problems at baseline. Further testing in larger samples is warranted using instruments assessing shorter time periods or supplementing self-report with objective measures.

Based on this feasibility study, Qigong practice was safe, portable, and easily adapted for injured service members. The self-reported improvements in stress, sleep, mood, and physical function are promising and merit further research. The results of this study have implications for educating nurses and other health care providers about the benefits of Qigong practice in the rehabilitation setting. Teaching basic Qigong skills can enable WII to learn practices that may mitigate their stress, and improve sleep and other symptoms that are affected by hyperarousal and the combat environment.

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