



Qigong and Musculoskeletal Pain

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Published online: 16 November 2019

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Abstract

Purpose of Review Musculoskeletal pain is a widespread symptom that commonly produces considerable disability, particularly in later life. This brief review strove to summarize and critically review the recent research base concerning the use of Qigong as a possible strategy for alleviating longstanding or chronic musculoskeletal pain states.

Methods Research reports and literature reviews specifically focusing on Qigong and its impact on various forms of musculoskeletal pain between 2015 and 2019 were sought and analyzed, along with related data.

Results Collectively, these data reveal that while more research is indicated, Qigong practice may help to attenuate pain in varying degrees among adults with different forms of chronic pain with few side-effects.

Conclusion More research is needed to ensure health professionals working with adults who have chronic unrelenting musculoskeletal pain may safely recommend these exercises as one possible remedy for reducing intractable musculoskeletal pain.

Keywords Chronic pain · Exercise; musculoskeletal pain; qigong · Rehabilitation · Treatment

Introduction

Various forms of arthritis, as well as injuries and health conditions such as osteoporosis that impact the musculoskeletal system are widespread conditions that produce varying degrees of long-lasting intractable pain, across all strata of society, regardless of the specific health condition, origin of pain, or pain type [1•]. As a result of the lack of effective treatments for all forms of chronic musculoskeletal pain, and the immense dangers associated with the excess use of narcotics that can only provide temporary pain relief, efforts are underway to identify interventions that are safe and practical for alleviating pain with few side-effects, while heightening mental health status as well as individual's ability to carry out his/her normal functions of daily living with minimal compromise.

In this regard, physical activity, often highly recommended for promoting optimal health states, regardless of health condition, is also advocated for treating many pain sufferers due to its reported direct, as well as possible indirect effects on reducing or controlling prevailing pain levels. However, when even the smallest movement may be excruciating, it may be extremely challenging for the sufferer to even contemplate exercise participation, regardless of proposed benefits. In turn, sedentary protective behaviors, such as being inactive, rather than active, are likely to worsen, rather than lessen overall pain, as well as impacting much needed sleep, the ability to control reflexive eating behaviors, stress, body weight, and the extent of prevailing depression and inflammation.

A mode of exercise that is not fatiguing or stressful, that does not require gym attendance, or costly equipment, and that has some observed benefits commensurate with other pain relieving modalities or exercise approaches must hence warrant attention. As well, an exercise approach that does not place undue impact or stress on affected joints, fracture, or soft tissue healing sites, may at least help to offset excess pain due to immobility issues, while possibly reducing prevailing pain along with depression, which increases pain, while heightening the functional capacity of people with musculoskeletal pain challenges.

This article is part of the Topical Collection on *Complementary and Alternative Medicine*

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In this context, Qigong, an ancient form of self-cultivating exercises originating in China that have been applied to promote healing and vitality, and to prevent or cure various diseases for more than 2000 years [2–5] involving breathing exercises [6], meditation, concentration, introspective awareness, and gentle body postures and movements [3] is a system of Yoga designed to reduce tension and quieten the mind [5, 7, 8•]. Often associated with spiritual healing [9], the fostering of optimal energy [5], and possible stress reduction [8•], Qigong exercises are not only designed for heightening wellness states [5], but are also advocated for reducing multiple symptoms associated with chronically painful musculoskeletal problems [10], and can be applied using one of two types of Qigong practice or both. Internal Qigong, requiring active practice, and/or External Qigong by virtue of energy transferred to a patient or client by a skilled and qualified master [11], or through acupressure, body massage, and breathing techniques [5]. Practical, because they can be carried out in the home or worksite in short time periods, with no equipment, and/or can be incorporated into standard intervention approaches [12], observed benefits include, but are not limited to, improvements in posture, coordination, and movement quality, as well as chronic pain of musculoskeletal origin [12].

Additional proposed and tentatively demonstrated benefits are those that extend to the immune system [3], sleep quality [3, 13], balance and agility [14], stress elicited cortisol secretion [8•], improvements in metabolic functions [8•], body composition [15], and interest in life [13], all possible factors that can negatively impact the perception and production of various pain states. Given the need to improve clinical treatments and outcomes that can impactfully attenuate or prevent chronic musculoskeletal pain, and that can be safely and effortlessly undertaken by most patients with various degrees of pain, this review examines the results of recent research concerning the degree of support for the application of Qigong as a safe and efficacious exercise approach for reducing various forms of unrelenting musculoskeletal pain.

Review Aim

Based on past literature observations that provide a reasonably strong rationale for examining Qigong in the context of efforts to attenuate musculoskeletal pain states [see Table 1], but mindful of the limited body of high quality literature in this realm, this review sought to examine the current evidence in support of applying Qigong as an independent or adjunctive effective pain relieving strategy for people with intractable forms of musculoskeletal pain. More specifically it examines the quality of the related research and potential efficacy of Qigong for reducing pain among people with various chronic musculoskeletal pain problems, regardless of mode of intervention, with a focus is on establishing a role for Qigong in the

Table 1 Selected sources of chronic musculoskeletal pain that could be impacted individually or collectively in a favorable way by Qigong participation based on an environmental scan of prior related literature

Somatic or Physical Sources

- Bone
- Circulatory problems [17]
- Diabetes [1•]
- Falls injuries [1•]
- Fractures
- Hypertension [19]
- Immune system imbalances
- Joint inflammation and swelling
- Joint instability
- Jointstiffness
- Ligament and/or tendon or joint capsular damage
- Muscle weakness and inflammation
- Muscle tightness and spasm
- Nerve damage
- Obesity
- Poor endurance and functional capacity [18]
- Poor posture and coordination [7]
- Sympathetic nervous system dysfunction
- Vasoconstriction [5]

Psychosocial or Cognitive Sources

- Depression and impaired mood [16]
- Endorphin levels
- Fatigue, sleep disturbances [20]
- Fear and anxiety
- Feelings of helplessness [21••]
- Low energy levels
- Lack of confidence in prevailing abilities to function, control pain [21••]
- Reduced or diminished social involvement/participation [1•]
- Reduced work ability
- Sleep disturbances [1•]
- Stress [8•]

context of chronic pain, a health condition defined by the presence of unresolved pain of at least three months duration, as opposed examining the intervention in the context of acute pain, which is usually short lived and commonly recovers spontaneously or resolves within ten days to three months.

Methods

To obtain the desired data, the electronic data sources **Academic Search Complete**, **PUBMED**, **EMBASE**, and **Web of Science** consolidated sites were searched. Years searched ranged from January 2015–June 2019 and key terms used for the search included **Qigong and Pain**. All studies

including systematic reviews were deemed acceptable for this review if they discussed the relationship between Qigong and pain outcomes, regardless of tool used. No age restrictions were imposed on the samples examined in the related research, and healthy as well as patient samples were deemed acceptable. Other criteria required articles to discuss Qigong of any form and its application as regards chronic musculoskeletal pain or pain outcomes in some way, and sources of both mechanical as well as inflammatory pain were deemed acceptable. Excluded were abstracts, non-peer reviewed articles, non-English based articles, articles based on Tai-Chi, which is similar but a more active therapeutic approach, and articles examining pain emanating from sources other than the musculoskeletal system, such as cancer pain. As well, Qigong articles that did not discuss the topic of musculoskeletal pain specifically, as well as those that were not focused on adult samples, those that focused on cell biology, or did not focus solely on Qigong exercises alone with or without an instructor were excluded. As a result of the limited numbers of recent empirical studies related to the present topic, and their heterogeneity, references of prior studies were sought and when surveyed, only a narrative review of the available data sources, their study methods and conclusions was deemed suitable for critically reviewing the status of this current topic. Extracted data included sample description, intervention approach, and pain outcomes, but nowhere were these consistent or duplicated in any way.

Results

As of June 1, 2019: *Academic Search Complete* yielded 84 articles in total; 39 in the last 5 years.

PUBMED yielded 117 articles in total; 48 over the last 5 years; *Embase* had 276 articles dating back to 1995, but very few were recent or related to the present topic. *Web of Science 5 Consolidated Data Bases* yielded 192 articles; 65 in the last 5 years when using the key words **Qigong and Pain**. Yet, despite efforts to limit the data solely to articles retrieved when using these key terms, the present search yielded a greater array of papers that had to be excluded, compared to those generally relevant papers or articles published over the last five years in these leading data bases. Of these, most were systematic reviews of heterogeneous studies published in the past, and only a small number were empirical studies directly related to chronically painful musculoskeletal conditions, and even fewer focused on pain as an outcome, and did not do this in any standardized manner.

Indeed, musculoskeletal pain populations studied were highly diverse or poorly categorized or both, and even when comparable, very few strategic components of these studies such as intervention approach, study time periods, and standardized outcomes were examined across any of the

prevailing studies. In addition to the limited study numbers, study designs were of variable quality, regardless of type, and not all showed favorable pain related post treatment effects, even when similar methods of intervention were applied.

In other instances, combined exercise approaches [12], or non standardized co interventions were possibly continued during the Qigong study period, pain was not examined as an outcome per se, or was examined among subjects with conditions unrelated to the musculoskeletal system [1•]. As well, limited sample sizes, diverse age ranges, and unknown randomization and blinding processes, plus a dearth of objectively defined outcomes continue to be evidenced [21••]. Moreover, subjects with comparable health attributes, specific pain or musculoskeletal diagnoses are rarely studied, and more often than not highly variable treatment modes of implementation prevail even when the same Qigong approach is applied [see Table 2].

In addition, several studies outlined in Table 2, which represent more than 95% of available studies on the present topic, yielded conflicting outcomes, regardless of whether similar samples or approaches were forthcoming or not. For example, even though one study of the moderator effects of traditional Chinese exercises for adults with low back pain recently reported that Qigong appeared to reduce subjective pain intensity significantly [24], the results failed to concur with those of Teut et al. [29] who examined yoga and Qigong application effects among older adults with chronic back pain. Instead, Teut et al. [29] found no clinically significant impact of Qigong when compared to control group intervention or yoga, even though actual absolute mean pain intensity scores were lowest in the Qigong group. Results were similar in this case to those noted in a systematic review by Girard and Girard [32] that concluded Qigong delivered by video or the Dantian method was no more effective than exercise therapy for reducing neck pain, even though earlier work showed increased levels of beta-endorphin and declines in adrenocorticotrophic hormone, potentially signifying important pain reduction effects, in response to Qigong training after several weeks of carrying out this activity [33].

Additionally, as with several reports of favorable post Qigong pain outcomes among adults said to have varying forms of chronic musculoskeletal pain [eg 4, 22, 23, 25, 27 and others in Table 2], even though Qigong intervention was deemed non significant in this collective overview, three of the five randomized controlled studies examined by Girard and Girard [32] showed pain benefits equal to exercise and more favorable outcomes than those of wait list controls, regardless of dosage. In addition, in one of the reported studies, 58% patients with non-specific chronic neck pain of a minimum of 3 months duration reported improved pain at 12 months in response to Biyun Medical Qigong [34].

In other work too, and in agreement with Zou et al. [1•], Yang et al. [11] found Qi-therapy reduced chronic pain

Table 2 Sample of available studies showing very little consistency and diverse conclusions

Author	Sample	Research and Intervention Strategy	Outcomes
An et al. [22]	28 cases with knee osteoarthritis	14 subjects received eight moves repeated 20 times of Baduanjin Qigong, 14 controls received no intervention	Percent changes on WOMAC pain scale were improved significantly compared to control group
An et al. [23]	29 knee osteoarthritis cases ages 55–82	Baduanjin Qigong was undertaken for 30 min 5 times per wk. for a year	WOMAC pain scores and SF-36 bodily pain scores improved significantly
Blodt et al. [24]	127 patients with chronic back pain were randomly allocated to receive Qigong or exercise therapy	64 patients attended 12 Qigong sessions for 90 min/week for 3 m; controls exercises for 12 sessions, 60 min per wk	Qigong outcomes were the same as those of regular exercises
Chen et al. [18]	112 adults with knee osteoarthritis were studied	External Qigong was applied by 2 practitioners and compared to sham intervention in a randomized controlled trial	Patients treated by healer 2 improved their WOMAC pain scores and function; overall function improved in both treatment groups
Coleman et al. [13]	122 subjects with chronic pain, 58% being in severe or very severe pain due to diverse musculoskeletal problems	Subjects were oriented to Spring Forest Qigong Level 1 They attended 3 meetings in a group, practiced the exercises for 30 min per day for 8 wk	86 subjects demonstrated improvements in pain measured by visual analogue scales over the study period More than 50% subjects in severe pain reported mild to moderate pain at 16 wks follow up 86% were still practicing Qigong at 16 wk
Haak and Scott [4]	57 women with fibromyalgia were studied	The study was a controlled randomized study with repeated measures with an intervention or a wait list control group The intervention group received Qigong support with an instruction tape and supervisors who were experienced Qigong masters provided external Qigong using the Lotus method (He Hau Qigong) for 7 wk. in total	At the post test, intervention patients reported significant pain decreases in intensity, as well as enhanced ability to control pain compared to the pre test and control group scores on a 7-point Likert scale
Lee et al. [10]	94 community dwelling elderly men and women with chronic pain of various diagnoses	Subjects, average age 64, were randomized to an experimental or placebo control group	For perceived pain and number of pain points there was no group effect for pain level, although this was reduced about 30% compared to 14%; for number of points, there was a significant interaction effect, number of points declined by 77% in active group and 27% in control group Pain decreased in active group
Liu et al. [25]	Fibromyalgia cases 20–70 yrs. of age of 8 years duration	Korean ChunSoo Qigong Performed by Masters was administered according to text book guidelines; the placebo Qigong was administered by the same Masters for 10 min	
Lynch et al. [26]	100 participants with fibromyalgia were randomly assigned to an immediate or delayed treatment group	Received Qigong or placebo twice per day for 6 wk. for 15–20 min group; and once for 45–60 min	
Phattharasupharek et al. [27•]	72 office workers with chronic non-specific low back pain age 20–40	Qigong training (level 1 Chaoyifanhuo Qigong, CFO), was given over 3 half-days, followed by weekly review/practice sessions for 8 wks; participants who were said to be stabilized on medications were also asked to practice at home for 45–60 min each day Qigong was examined and compared to a wait list control group allocated randomly Qigong type Guan Yin Zi Zai Gong level 1 was undertaken one hour a week at workstations and at home; wait list group received advice about low back pain management	Significant benefits in pain, impact, sleep, physical and mental function occurred compared to wait-list/usual care control group at 8wk, with benefits extending beyond this period Pain intensity using a visual analogue scale showed significant benefits in the experimental group but no pain effects were noted in the control group
Redant et al. [28]	123 patients ages 20–40 with chronic neck pain, 88% women	Patients were randomized into Qigong, exercise, and wait list control groups	After 6 m a difference in pain in last 7 days on a visual analogue scale was noted between Qigong and control groups, but exercise group performed similarly to Qigong group
Teut et al. [29]	Older adults 65 ys of age or more with chronic low back pain were studied	176 patients were randomly assigned to yoga or Qigong classes or control group who received no intervention	Pain intensity ratings of the Functional Rating Index were similar for all groups at 3 m
Vincent et al. [9]	50 subjects with chronic pain of varying duration and diagnoses attending a Spring Forest Qigong Center	3 months of exercise of differing duration were implemented Participants were randomized to receive external Qigong treatment by Qigong therapists or equivalent attention time in weekly 30-min sessions for 4 wk	Pain intensity on a visual analogue scale showed active group improvements at weeks 2, 3, and 4 compared to the control group These differences persisted at 8 wks but did not meet standards for statistical significance

Table 2 (continued)

Author	Sample	Research and Intervention Strategy	Outcomes
Yang and Kim [11]	43 elderly with chronic pain	Patients were randomly assigned to intervention or general care group External Chun Soo Qi-therapy was given for 20 min twice per wk. for 4 wk. to intervention group by one practitioner	Pain intensity on a visual analogue scale decreased over time in the intervention group in a dose dependent way at 4 wk., but not in the control group Improvements were independent of duration of pain diagnosis The effects were maintained 2 wk. after intervention completion Qigong group had greater pain improvements than control group using Northwick Park Neck Pain Questionnaire and VAS After 3 m no differences in pain measured by a 100-mm visual analogue scale method existed between the active group or the other groups
Wang et al. [30]	72 cases with neck pain with an average age of 58.23 yrs	Active Ba Duan Jim Qigong group underwent 7 30-min or longer sessions of exercise for 6 m controls received behavior guidance	
Von Trott et al. [31]	117 elderly chronic neck pain patients of an average of 19 yrs. duration, 95% women ages 76 yr on average	Patients were randomly assigned to a Qigong treatment group or exercise group or wait list control group Qigong involved movement, breathing, and relaxation; exercises applied for same 45 min duration were pursued	No effect was noted for either Qigong or exercise at 6 m

Abbreviations: min = minutes; m = months; mm=millimeters; VAS= Visual Analogue Scale; wk. = weeks; WOMAC=Western Ontario and McMaster Arthritis Functional Scale; yrs. = years

experienced by elderly people, a hard to treat group, even though earlier von Trott et al. [31] found no significant benefits for elderly with high levels of chronic pain. Besides these aforementioned benefits, mood state, often linked to pain, improved with the duration and frequency of the Qi therapy intervention in the experimental group, but not in the control group [31] suggesting an important dose response association. These results were also in line with those of Chen et al. [35] who also noted positive prolonged post Qigong pain effects in 10 cases with arthritis, as well as those of Lee et al. [10] where elderly participants with pain exhibited significantly reduced blood pressure, anxiety, depression, fatigue, and pain levels compared to a placebo group post Qigong intervention. Prior research also provides some support for the application of Qigong for reducing various aspects of pain in fibromyalgia patients [4], chronic pain of three months duration or more [10], chronic neck pain and suffering [30], and for producing pain relief among chronic low back pain patients comparable to that achieved by exercise therapy [23].

In addition to reducing movement disability in cases of painful arthritis that prevailed for a considerable period post Qigong treatment [35], possible favorable impacts on body composition [14, 15], often associated with joint pain, owing to its inflammatory component, as well as excess joint stress component in the overweight individual, were not examined. Alternately, recent work which showed office workers with low back pain benefited significantly compared to controls after six weeks of Guan Yin Zi Zai Gong Qigong level 1 intervention, also showed mental status, heart rate, muscle strength and function were all significantly improved post Qigong practice [27•].

However, as noted by Bai et al. [36•] effects produced by Qigong exercises might depend not only of the form of Qigong used [there are said to be 2–3000 forms], but on its dosage, duration, and frequency of practice [37], as well as if the desired practices are carried out independently or not, as well as if done correctly, optimally, and regularly. As well, age, emotional status at baseline, initial pain magnitude and duration, pain type, processing, and perceptual differences [38••], extent, and quality, as well as suitability of exercises for the pain condition all appear important in efforts to understand the impact of Qigong study results, regardless of whether they support or do not support Qigong applications. Alternately, the widespread and exclusive use of differentially applied subjective reported pain measures to detail Qigong pain effects and failure to examine outcomes among adequate size patient samples, along with unclear efforts to account for any ongoing co-interventions [eg pharmacotherapy]-if relevant-as well as time on task [37], such as number of practice days, and their duration and intensity undoubtedly adds to the challenge of unifying this body of data, differentiating its true effect from any placebo effects, or masking its true effect regardless of source, type, or year of study.

The crucially important role of pain history, pre-existing conditions, group prognoses, attention effects, health and instructor characteristics and expertise, which has also not been carefully examined or controlled for to date in any meaningful way, further adds to the challenge of arriving at any valid conclusion on the present topic. As well, mechanisms of action underpinning any observed pain associated Qigong outcomes in adults with chronically painful musculoskeletal conditions are either not studied or are very poorly studied [37], as is the potential role of ongoing co-interventions, program adherence, and instructional explanations. How Qigong differs or overlaps with other exercise modes tested in some related studies also remains elusive [39]. The lack of attention to the application of advanced modes of statistical analysis, rather than simple inferential approaches alone is also more prevalent in this body of research than anticipated.

In sum, despite some favorable trends, Table 2 representing most available Qigong oriented studies on this current topic of chronic musculoskeletal pain shows there is no consistent effort in the related English language literature in this regard. Outcomes too, are not all favorable, but even if they are, very few studies focus on assessing which biopsychosocial attributes of chronic musculoskeletal pain appear to be impacted favorably or unfavorably by Qigong.

Indeed, when considering that Qigong may be carried out in highly different formats and that vastly differing musculoskeletal disorders and varying degrees of pain, pain sites, and duration prevail in most communities, more work is clearly indicated to firmly establish whether Qigong is likely to be a useful stand-alone or complementary treatment approach that consistently produces significant long lasting beneficial pain alleviating effects referred to in the literature, and that are depicted in Table 3.

Discussion

Although modern medicine has been successful in managing infection and saving the lives of trauma victims [43], preventing or treating the extent of the disability associated with chronically painful musculoskeletal conditions remains extremely challenging. Since pharmacologic and surgical approaches are often limited in scope, may do more harm than good, or may be contra-indicated for ameliorating one or more of these painful conditions, a growing evidence base suggests alternative low risk approaches, especially those that involve exercise and meditation elements, such as Qigong, might be highly advantageous, even among those with advanced disease or irreversible musculoskeletal pathology. Moreover, adherence to exercise, a key health recommendation for most persons, including those suffering chronic musculoskeletal pain, which is often very poor, rather than adequate, may be heightened given the attributes of low impact and low intensity

commonly associated with this exercise approach. In addition to direct pain alleviating effects, the combination of graceful gentle, slow paced movements along with focused mind exercises of Qigong [37] may also foster multiple improvements in overall physiological and psychological health [44] and produce calming and relaxing effects [45] that help to reduce or control excess pain. As well, posture, breathing [44], circulation, glucose control, and depressive symptoms [46] may also improve even when Qigong is only practiced for short periods of time. By contrast, even though general exercise is recommended for relieving or reducing chronic pain states, the movements evoked by regular exercise or movement applied to persons with chronic pain may not always be helpful if joints or muscles are inflamed, or readily fatigued, or both, or central sensitization of pain prevails. On the other hand, Qigong exercises are deemed to safely organize disturbances of Qi or body energy thought to produce pain, and can be readily adapted for most people including frail elders and others who may be in pain, but where stressful body movements would be unsafe.

Consequently, while Qigong is clearly not a panacea by any means, and its clinical efficacy as regards long standing musculoskeletal pain reduction is not proven, or convincing enough [37], sufficient data imply that this non invasive health practice approach is certainly worthy of further study to validate whether the approach if practiced consistently will yield more favorable outcomes than not with few side effects as far as pain relief is concerned [47] as suggested 20 years ago by Wu et al. [5]. Explanations for its documented outcomes, which include muscle relaxation, improved blood flow and delivery of nutrients, as well as pain-killers and other drugs, plus the more efficient removal of pain mediators should be examined more thoroughly as well [18].

In the meantime, related research does show Qigong may be of specific value in treating sources of inflammatory musculoskeletal pain [48], fibromyalgia [49••], and in preventing low back pain [12]. Found to reduce medication dosages [12], Qigong practice may also alter inflammatory biology in a favorable way [50], while providing better overall health benefits than medication alone [6], and outcomes comparable to other forms of exercise that could be challenging to carry out or harmful to painful joints, while increasing pain. As well, Qigong participation, said to be more easy to maintain than regular exercises [45], may not only help to reduce pain intensity levels, but may help to diminish actual numbers of painful sites [37], foster independence and wellbeing, plus the ability to effectively cope with pain [10]. Its application may also help in reducing pain correlates such as depression, anxiety, and stress, as well as emotional distress [13]. Moreover, even if the affected individual cannot exercise actively, external Qigong applied to promote muscle relaxation and blood flow in an effort to reduce pain can be anticipated to be successful if the practitioner is highly skilled [51], even if only one 10 min session is forthcoming [10].

Table 3 Hypothetical figure depicting multiple possible outcomes of Qigong practice that could potentially impact pain in the context of various painful longstanding musculoskeletal conditions either independently or collectively and that warrant investigation

Physical Outcomes	Cognitive Outcomes
Increased aerobic capacity/energy	Improved mental function
Improved balance	Improved mood state
Increased blood flow	Improved parasympathetic activities
Improved blood pressure control	Improved Serotonin, Dopamine, Epinephrine levels
Improved body composition	Improved sleep quality
Improved fitness	Improved self-efficacy
Improved flexibility and range of motion	Reduced stress and anxiety levels
Improved functional ability	
Improved general health status	
Improved glycemic control	
Improved immune function	
Improved joint status and alignment	
Improved movement harmony	
Improved muscle endurance	
Improved muscle strength	
Improved muscle tone	
Improvements in pain threshold	
Improvements in posture	
Physical function	
Improved circulation of pain-killing substances	
Reduced inflammation	
Reduced stiffness of joints	
Reduced numbers tender points	

Adapted from: Wu et al. [5]; Gallagher [7]; Ponzio et al. [8•]; Lee et al. [10]; Coleman et al. [13]; Wang et al. [16]; Ladawan et al. [19]; Lynch [37]; Lauche et al. [39]; Astin et al. [40]; Mannerkorpi and Arndorw [41]; Potrola et al. [42•]; Manzaneeque et al. [55]; Lee et al. [66]

In addition, even if Qigong is not superior to regular exercises [32], people with chronic musculoskeletal pain who are generally more likely than not to be reluctant to adhere to activity programs that are necessary to keep them mobile and functional, may face fewer pain flare ups when considering Qigong, which is generally a pleasurable form of movement performed slowly using natural non-stressful movements achievable by most people. Moreover, even if Qigong is not totally successful when examined in the context of some meta analyses [eg 52, 53••], the fact that Qigong may be helpful in encouraging and motivating people with various forms of chronic musculoskeletal pain to not only participate in- but to adhere to exercise participation over the long-term, may prove especially valuable in fostering a state of improved health status and life quality. This is because patients with chronic pain who fail to participate in consistent exercise activities-commonly incur worse joint pain, sleep challenges, depression, and related forms of dysfunction, including worsening of any comorbid conditions, or the onset of these. They may hence be more challenged economically, socially, and functionally than they need to be.

However, to rectify the substantive short comings in this body of literature, which is promising, but inconclusive, as outlined by several authors [eg., Bai et al. 36•], more careful

subject selection, rigor in controlling for any potentially confounding intervention parameters, co-interventions, and other confounders, plus the use of standardized adequately blinded and valid diverse evaluation approaches, including the possible influence of Qigong on self-regulatory pain control skills, pain self-efficacy [54], mood, sleep, and serum cytokines [55], and life quality [56] is indicated to tease out any salient Qigong pain associated mediating or moderating variables of influence, and their relative importance over and above any placebo effect.

In particular, although studies with varied designs have shown promise, very carefully designed high quality adequately powered randomized controlled comparison studies of different Qigong approaches and protocols that control for the potentially confounding role of medication usage, and/or other co-interventions, plus consistency in the delivery of the multiple aspects of any Qigong intervention protocol as well as adequate control interventions are indicated [24–26]. The role of age, health status, and gender, plus the impact of Qigong instructor characteristics, quality, duration and frequency of Qigong practice needed to effect positive pain changes in diverse groups should also be carefully investigated over extended time periods [27•]. Whether Qigong is comparable or not to various pain relieving medication regimens,

and whether the mind-body modality is significantly influenced by expectations or beliefs which has not been studied would enable a better determination of the utility of Qigong for mediating or moderating cases with various degrees and types of chronically painful musculoskeletal conditions, as well as the importance of tailoring.

In the meantime, Von Trott et al. [31] and others have found Qigong to not only produce benefits commensurate with traditional exercises among older adults with chronic neck pain, but that more elderly subjects may choose to continue Qigong rather than regular exercise, which may be highly important in the context of exercise adherence. A specific form of Qigong that appears highly promising and warrants attention in this regard is Spring Forest Qigong [9, 13]. Another is Baduanjin [57].

Conclusion

Although the literature is limited in depth and its validity can be questioned, and some articles may have been overlooked, in light of the magnitude of the immense public health burden associated with chronic pain and the likelihood of this increasing—rather than decreasing as society ages—and the encouraging finding of no short-term detrimental effects post-Qigong participation on pain production, the potential for Qigong movement therapy to minimize or reduce the pain of these sufferers, regardless of their pain status [21••] should be explored further.

To this end, well-designed comparative studies of separate forms of pain, and various forms of Qigong, along with adequate samples of various age ranges, and a design that carefully controls for attention effects may help to establish which persons in pain are most likely to benefit optimally from the various forms of Qigong, if any. Studies that examine the cognitive, cellular, biological, physical, and molecular mechanisms using advanced technologies may help explicate any underlying mechanisms associated with the observed benefits of Qigong for reducing or moderating pain. What dosage of Qigong is likely to yield optimal pain relieving results should also be examined in more extensive follow-ups than currently prevail.

In the interim, to assist adults with a variety of intractable chronic musculoskeletal painful conditions to achieve a better life quality, and improved pain status, it appears clinicians should not overlook the potential wide-reaching physical and psychological benefits of Qigong for ameliorating pain, with its encompassing physical and cognitive features that are recommended as salient non-invasive nonpharmacologic treatments for chronic pain conditions [58]. Its application, which may not be suitable for everyone [49••] because it requires diligent practice, may indeed provide significant sustainable relief for many from a variety of painful symptoms without the damaging side effects of many other forms of intervention [59], including opioids [62]. The fact that the

movements involved protect internal organs from harm, and are performed more slowly than more Westernized exercises, and involve thinking and concentration, rather than mindlessness may further provide a unique approach to reducing pain with few side effects. If practiced consistently and according to protocol, they may also help participants to deal more effectively with mental as well as physical stressors that produce pain [17, 18, 60–63], comorbid conditions that impact pain negatively [19, 20], while permitting patients to be active rather than passive partners in their recovery. As well, better balance control may prevent falls that can lead to further disability [63] and disablement and pain, while Qigong may prove especially beneficial for those with inflammatory arthritis who cannot take medication, even if the exercises are only carried out for short periods. The exercises may also influence sleep quality [1•, 64], physical function [63, 65], pain coping, fatigue, functional brain changes, and mood [66–69], plus immune system functioning, favorably and significantly [3].

Readily adapted to accommodate postural limitations, Qigong interventions mediated by internal or external instructional procedures or both can be practiced independently or as a treatment adjunct, and can be tailored for most people with a variety of musculoskeletal challenges, regardless of age or extent of disability. Additionally, this form of therapy appears to be sufficiently flexible to accommodate different people's preferences for exercise quite successfully, given its many different modes and formats, and may enable patients to reduce or forego addictive possibly life-threatening or health risk outcomes of many pain-related medications. The thoughtful application of Qigong may not only attenuate a multitude of physical and mental health symptoms that exacerbate pain, such as sleep duration [55], but importantly, may enhance life quality, as well as physical function and psychological wellbeing [55]. In this regard, sufficient consensus supports the development of further trials to tease out more definitive Qigong effects, and how much practice is needed to effectively ameliorate specific musculoskeletal pain-associated conditions, and which will undoubtedly provide further clinical insights into the utility of this promising pain-alleviating approach.

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