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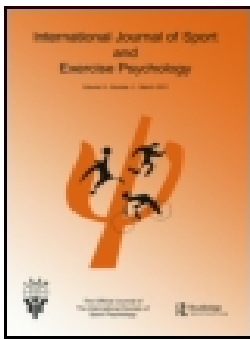
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Long-term QiGong practice is associated with improved self-perceived health and quality of life

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In cross-sectional studies, we examined the long-term practice effects of QiGong exercise on perceived health and quality of life (QoL) in middle-aged (over 50 years) Japanese individuals. In Study 1, Japanese adults ($n = 320$) who practised QiGong responded to a questionnaire concerning the perceived benefits of QiGong practice and QoL. In Study 2, we collected data from QiGong participants who attended a QiGong conference ($n = 799$). Participants in Study 1 perceived that QiGong affords physical, psychological, and social benefits and QiGong duration in years correlated strongly with QoL. In Study 2, those who practised QiGong for 0–3 years vs. 13+ years reported a greater likelihood of perceived palpitation, insomnia, a lack of vigour, and attention deficit (odd ratios 1.56–2.60, all $p < .01$) with similar trends for joint pain, depression, and forgetfulness. QiGong practice for 13+ vs. 0–3 years reduced perception of physical fatigue, poor physical health, joint pain, insomnia, problems with attention, forgetfulness, and anger (odd ratios 1.95–2.85, all $p < .05$). However, there were no differences in the effects between other practice periods ($p > .05$). QiGong is a multi-component form of physical activity, which – if practised for prolonged periods – affords motor, cognitive, social, and QoL benefits.

Keywords: QiGong; exercise; self-perceived health; quality of life; middle-aged

Introduction

QiGong is a traditional Chinese exercise system that integrates diverse body postures, breathing control, focused intention, deep relaxation, visualisation, and self-applied massage (Garber et al., 2011; Sancier & Hu, 1991). QiGong has a long history. Movements similar to those used in today's QiGong practice appear on painted artefacts made in 206 BC–AD 220 during the imperial reign of the Han Dynasty (The Chinese Health QiGong Association, 2012). To date, 70 million people practice QiGong in China and many more around the world (Chen, 2000). The combination of the motor and meditative elements favourably affects cardiorespiratory function, mobility, and mood (Garber et al., 2011; Larkey, Jahnke, Etnier, & Gonzalez, 2009) and responses to QiGong correspond to those observed during self-paced walking (Larkey et al., 2009) in healthy old adults (Ng & Tsang, 2009). The physical and mental conditioning effects of QiGong can also increase healthy old adults' quality of life (QoL) (Sancier & Holman, 2004).

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Compared with its ancient roots, research history of QiGong is much shorter. However, systematic reviews summarising 30 years of research on QiGong have consistently demonstrated its favourable effects on medical outcomes, including mobility disability (Jahnke, Larkey, Rogers, Etnier, & Lin, 2010), immune function (Wang et al., 2012), fibromyalgia (Chan et al., 2012c), hypertension (Lee, Pittler, Guo, & Ernst, 2007), symptoms of Parkinson's disease (Goodwin, Richards, Taylor, Taylor, & Campbell, 2008), and depression (Tsang, Chan, & Cheung, 2008), and QoL (Jahnke et al., 2010). Indeed, several randomised and quasi-experimental trials and case studies revealed that bouts of QiGong can improve metabolic syndrome (Liu, Miller, Burton, & Brown, 2010), Type 2 diabetes (Tsujiuchi et al., 2002), chronic fatigue syndrome (Ho et al., 2012), chronic neck pain (Rendant et al., 2011), brain function (Litscher, Wenzel, Niederwieser, & Schwarz, 2001), and aerobic capacity (Lan, Chou, Chen, Lai, & Wong, 2004). Application of QiGong has thus been prevalent in disease prevention and health promotion, early intervention for diagnostic population, rehabilitation, and palliative care (Chan et al., 2012a, 2012b; Garber et al., 2011; Sancier & Hu, 1991).

However, the majority of previous studies documented the acute effects of QiGong on physical and psychological outcomes. In a randomised clinical trial comprising 30–60 min sessions for 8 weeks to 12 months also demonstrated favourable effects on physical and psychological outcomes (Wang et al., 2014; Zou et al., 2017). The effects of long-term QiGong practice on physical and mental health, health promotion, QoL and self-perceived health are unknown. Because QiGong practice has favourable immediate and short-term effects on a variety of outcomes, we hypothesised that long-term QiGong practice improves self-perceived health, an outcome strongly associated with mobility and survival (Burstrom & Fredlund, 2001; Idler & Benyamini, 1997). Considering modest rates of adherence to conventional exercise programmes at any age (Sperandei, Vieira, & Reis, 2016), it is important to offer exercise practitioners physical activity choices that produce positive self-awareness and self-perceived health. Study 1 identified the self-perceived benefits of QiGong exercise and determined the relationship between long-term QiGong and QoL. Study 2 determined the relationship between QiGong practice for over 13 years and the prevalence of physical and psychological dysfunction Japanese QiGong practitioners over age 50 years. Such findings would provide evidence that QiGong practice could improve self-perceived health, including QoL.

Study 1

Study 1 determined participants' perceptions towards QiGong exercise and examined the relationship between QiGong and QoL.

Methods

In study 1, we collected data by administering two questionnaires. We asked 350 individuals attending QiGong classes in Saitama prefecture in North West metropolitan Tokyo, Japan, to fill in a questionnaire. Of the 346 (98.9%) received the questionnaire. In Study 1, we excluded data, which did not impute demographic information, 26 of 346 (7.5%). Three hundred twenty participants (91.4%) completed and returned the questionnaire.

The questionnaire had one open question concerning the perceived benefits of QiGong practice, "What benefits did you expect when you started practising QiGong?" We also measured QoL by the valid and reliable Japanese version of the WHOQOL-26, published originally by the World Health Organization (Skevington, Lotfy, & O'Connell, 2004; WHO, 2016). We used three domains: general, physical, and psychological QoL. In the present study samples, the Cronbach's alpha coefficients for these three domains were .77, .73 and .81, respectively.

The 1.0% missing WHOQOL-26 data was replaced by the grand mean value. Sample characteristics were characterised by a Chi-square test. Cohen's w was calculated to estimate size of bias and classified as .10 = small, .30 = medium, and .50 = large (Cohen, 1992). We applied a thematic analysis to the qualitative data, including the steps of: (a) data screening; (b) data coding of information based on content by two independent researchers; (c) theme classification; (d) reviewing and modifying the classified themes, and (e) defining themes (Braun & Clarke, 2006). Two trained researchers (authors: TS, MK) conducted the thematic analyses and three researchers (authors: TS, MK, SS) resolved inconsistencies.

Part 2 of analysis for Study 1 comprised the computation of partial correlation coefficients and an analysis of covariance (ANCOVA). Partial correlation coefficients were calculated to identify the relationship between QiGong duration and QoL moderated by age, gender, and profession. We also considered whether or not the relationship between QiGong practice and QoL was linear. ANCOVA was conducted to identify differences in QoL across four levels of QiGong experience. QiGong experience was defined in quartiles of 0–3, 4–7, 8–12, and over 13 years based on data in Study 2. The model was adjusted for age, gender, profession, and QiGong duration. Cohen's f was calculated to quantify the influence of demographics. Cohen's f was categorised as 0.10 = small, 0.25 = medium, and 0.40 = large (Cohen, 1992). Sub-effect analyses were performed by Bonferroni's method. All analyses were done in IBM SPSS Statistics 24 and R version 3.3.1.

Results

In Study 1, most participants at the QiGong event were 69–75 years old (73.8%, $\chi^2 = 84.1$, $p < .01$, $w = .51$), female (85.6%, $\chi^2 = 162.5$, $p < .01$, $w = .71$), and unemployed (86.6%, $\chi^2 = 13.7$, $p < .01$, $w = .21$) (Table 1).

Table 2 shows that QiGong affords perceived physical, psychological, and social benefits. Concordance between two reviewers relative to physical, psychological, and social benefits was 86.7%, 73.2%, and 100%, respectively. Physical benefits appeared as improved physical

Table 1. Participants characteristics in Study 1 ($n = 320$).

	<i>n</i>	%
Age, years		
≤60	16	5.0
69–65	70	21.9
66–70	86	26.9
71–75	80	25.0
76–80	46	14.4
≥80	22	6.9
Gender		
Female	274	85.6
Male	46	14.4
Employment		
Employed	43	13.4
Unemployed	277	86.6
Qigong experience, years		
0–3	98	30.6
4–7	95	29.7
8–12	64	20.0
≥13	63	19.7

Table 2. Participants reporting perceived improvements in physical and mental health as a result of qigong practice based on theme analysis ($n = 320$).

Identified theme	Theme elements	Report perceived improvement, Number	Total response
<i>Physical</i>			
Motor function	Quality of life	18	73
	Move easily	17	
	Flexibility	16	
	Posture	13	
	Falls	3	
	Balance	3	
	Body mass	2	
	Effects of age lessened	1	
Fitness	Less often ill	24	41
	General strength	9	
	Leg and back strength	7	
	Recover faster from fatigue	1	
Pain	Back	11	29
	Knee	7	
	Stiff neck	6	
	Ankle	4	
	Neck	1	
Bodily function	Breathing	11	22
	Sensitivity to cold	3	
	Constipation	3	
	Blood pressure	3	
	Stomach ache	1	
	Blood profile	1	
Illness	Insomnia	6	17
	Headache	5	
	Lungs	2	
	Allergy	2	
	Autonomic imbalance	1	
	Diabetes	1	
	<i>Psychological</i>		
Vigour, energy	Mentally satisfied	17	36
	Life is fun	16	
	Purpose to life	2	
	Desire to live	1	
Emotions	Being positive	14	29
	Mood	11	
	Fulfillment from co-engager	2	
	Vigour	2	
Concentration	Attention	3	5
	Fresh mind	2	
Cognition	Thinking clearly	3	3
Relaxation	Becoming mindful	1	1
<i>Social</i>			
Extroversion	Enjoy talking with friends	17	19
	Talking with new friends	2	

and vital organ function, higher fitness, less joint pain, and fewer diseases. Psychological benefits were increased vigour, positive emotional arousal, better concentration, increased cognitive function, and an ability to relax. A few participants reported becoming more extrovert as a social benefit.

Table 3. Difference of QOL among experience of qigong exercise.

	0–3 years		4–7 years		8–12 years		13 years–		<i>F</i> value	Cohen's <i>f</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
General	3.09	0.68	3.33	0.58	3.48	0.54	3.61	0.72	6.94**	0.26
Physical	3.37	0.54	3.44	0.48	3.47	0.38	3.61	0.51	3.29*	0.18
Psychological	3.35	0.46	3.44	0.49	3.52	0.50	3.65	0.51	3.36*	0.18

Note: * $p < .05$; ** $p < .01$.

Partial correlation coefficients adjusted for age, gender, and employment were small to medium between QiGong duration (years) and general ($r = .25$, $p < .01$), physical ($r = .17$, $p < .01$), and psychological ($r = .18$, $p < .01$) QoL, respectively. ANCOVA revealed a strong relation of QiGong practice duration (years) and QoL (general: $F = 6.94$, $p < .01$, $f = .26$; physical: $F = 3.29$, $p < .05$, $f = .18$; psychological: $F = 3.36$, $p < .05$, $f = .18$, Table 3). Participants with an exposure to QiGong over 8 years had higher general QoL than the group pursuing QiGong for 0–3 years ($p < .05$ for 8–13 years and $p < .01$ for >13 years). Physical and psychological QoL was higher in the 13+ years QiGong compared with the 0–3 years QiGong group (both $p < .05$).

Discussion

The thematic analysis revealed that many practitioners perceived QiGong to exert favourable effects on motor function. In particular, 73 of 320 (22.8%) practitioners perceived the benefits of QiGong practice as improved movement-related QoL, less difficulty with movement, and greater flexibility. While QiGong, similar to Tai Chi (Tsang & Hui-Chan, 2004), involves weight shifts (Rogers, Larkey, & Keller, 2009), only 3 of 73 (4.1%) respondents in the motor category perceived that QiGong helped reduce falls. This low rate of perception may be related to our participants' relatively high health status and low fall rate at the time of starting to practice QiGong. Many QiGong practitioners reported the perception of being ill less often due to improved fitness. The composite nature of QiGong is likely to cause practitioners perceive less pain, better bodily functions, and having fewer medical conditions. The second largest category of perceived benefits was in the domain of psychology followed by the social domain. Over 20% of the 320 respondents named vigour, energy positivity, and good mood as psychological and emotional benefits, complementing some but not all vigour related data. Finally, a small number of old adults reported that they perceived themselves becoming more extrovert and friend seeking, resonating with WHO's inclusion of social factors in the definition of health and with the role peers play in adherence to exercise (WHO, 2017).

In addition, partial correlation coefficients and ANCOVA revealed a relationship between long-term QiGong practice and QoL. A previous small sample cross-sectional study observed no relationship between the number of years of QiGong practice and QoL (Ho et al., 2011). However, our data suggest that years of QiGong improve physical and psychological QoL, an observation that is in line with the conclusions of a systematic review of how physical activity affects health-related QoL in the general population (Bize, Johnson, & Plotnikoff, 2007).

Study 2

In Study 2 we examined the prevalence and improvements of health problems as a result QiGong practice.

Methods

Participants attended the 15th annual conference of Daoyin Yangsheng Gong (DYSG), representing the main school of QiGong exercise. Of the 1200 conference attendees, all of whom were QiGong practitioners, 74.0% or 888 returned the survey at the end of the conference. Only surveys with complete answers were included in the analyses ($n = 799$, 66.7%).

We asked participants to report their age, gender, the number of years they have been practising QiGong and the perceived presence of five physical and five psychological problems. We hypothesised that regular long-term QiGong would minimise these problems based on findings in study 1. Physical factors were the perceived presence of: 1. Physical fatigue; 2. Poor physical health; 3. Joint pain; 4. Heart beat irregularity, and 5. Poor sleep. Psychological factors were the perceived presence of: 1. Low energy; 2. Depression; 3. Poor concentration; 4. Forgetfulness, and 5. Anger. A “Yes” answer denoted the presence of a condition. In addition to documenting the presence of a condition, we also asked participants whether the condition improved after engaging in QiGong: “If you had this health problem when you started practising QiGong, did this problem improve after engaging in QiGong”. The answer choices were: “Did not improve”, “Somewhat improved”, and “Improved significantly”.

In Study 2, we categorised responses for each of the five physical and psychological variables as “Did not improve” and “Improved” by combining “Somewhat improved” and “Significantly improved” into one category. We performed logistic regression analyses adjusted for age and gender to determine the effects of QiGong duration on prevalence and improvement of self-perceived health and psychological problems. We computed crude and adjusted odds ratios (OR) and 95% confidence intervals (CI) to determine the risk of perceived physical and psychological problems relative to 13 years of QiGong practice (“prevention effect analysis”). We referenced the QiGong’s health-improving effects to the 0–3 years of QiGong experience category (“health promotion analysis”) including only participants who reported health problems.

Results

In Study 2, most participants at the QiGong conference were 69–75 years old (70.6%, $\chi^2 = 176.0$, $p < .01$, $w = .47$) and females (88.6%, $\chi^2 = 476.5$, $p < .01$, $w = .77$). The number of participants reporting physical fatigue (66.7%, $\chi^2 = 74.6$, $p < .01$, $w = .33$), joint pain (50.4%, $\chi^2 = 47.9$, $p < .01$, $w = .28$), problems with attention (49.1%, $\chi^2 = 13.4$, $p < .01$, $w = .14$), and forgetfulness (60.7%, $\chi^2 = 119.6$, $p < .01$, $w = .42$) was higher than those not reporting such health problems (Table 4).

Table 5 shows that participants with 0–3 vs. 13+ years of QiGong practice perceived to have palpitation (adjusted OR: 2.69, $p < .01$), insomnia (1.67, $p < .01$), a lack of vigour (2.08, $p < .01$), and attention deficit (1.56, $p < .01$). There was a similar trend for the same comparison for joint pain, depression, and forgetfulness. Logistic regression analyses showed that long-term QiGong practice seemed to reduce the perception of health problems.

Table 6 shows that long-term QiGong experience of 13+ vs. 0–3 years reduced perception of physical fatigue (adjusted OR = 1.80, $p < .05$), poor physical health (1.99, $p < .05$), joint pain (1.90, $p < .05$), insomnia (2.32, $p < .05$), problems with attention (1.95, $p < .05$), forgetfulness (2.08, $p < .05$), and anger (2.85, $p < .01$). For a similar comparison, there was a trend for palpitation.

Discussion

Using 13+ years of QiGong practice as a reference, practitioners reported a reduced perception of the presence of ailments. Those who practised QiGong for 0–3 vs. 8–12 years reported the perception of 50% higher odds of having joint pain, 60% greater odds of having palpitation, 40%

Table 4. Participants characteristics in Study 2 ($n = 799$).

	<i>n</i>	%
Age, years		
≤60	111	13.9
69–65	156	19.5
66–70	221	27.7
71–75	187	23.4
76–80	91	11.4
≥80	33	4.1
Gender		
Female	708	88.6
Male	91	11.4
Qigong experience, years		
0–3	217	27.2
4–7	207	25.9
8–12	194	24.3
≥13	181	22.7
Health problems		
Physical fatigue		
Yes	445	66.7
No	222	33.3
Poor physical health		
Yes	340	52.1
No	313	47.9
Joint pain		
Yes	403	63.8
No	229	36.2
Palpitation		
Yes	187	28.5
No	468	71.5
Insomnia		
Yes	315	47.6
No	347	52.4
Low energy		
Yes	313	47.6
No	380	52.4
Depression		
Yes	225	32.1
No	476	67.9
Poor attention		
Yes	392	57.0
No	296	43.0
Forgetfulness		
Yes	485	70.9
No	199	29.1
Anger		
Yes	326	49.5
No	332	50.5

Note: Percentage of the health problems were calculated excluded missing data.

greater odds of having depression, and 30% higher odds of being more forgetful. The ineffectiveness of short-term QiGong practice on joint pain is similar to data reported in a review (Geneen et al., 2017). While there was a positive effect of QiGong on perceived palpitation, there was still a perception of having a near 2-fold greater odds of palpitation in the 8–12 years group, a finding

Table 5. Effects of qigong experience on prevalence of health problems ($n = 799$).

	Qigong experience, years						≥13
	0–3		4–7		8–12		
	Crude OR (95%CI)	Adjusted OR (95%CI)	Crude OR (95%CI)	Adjusted OR (95%CI)	Crude OR (95%CI)	Adjusted OR (95%CI)	
<i>Physical</i>							
Fatigue	1.36 (0.85, 2.19)	1.31 (0.81, 2.11)	1.09 (0.69, 1.72)	1.06 (0.67, 1.67)	1.05 (0.66, 1.68)	1.03 (0.65, 1.65)	1
Health	1.22 (0.78, 1.91)	1.17 (0.75, 1.83)	1.38 (0.89, 2.14)	1.34 (0.87, 2.09)	1.39 (0.88, 2.19)	1.37 (0.87, 2.16)	1
Joint pain	1.51 (0.94, 2.43)	1.62† (1.00, 2.61)	1.18 (0.75, 1.86)	1.23 (0.78, 1.94)	1.1 (0.69, 1.76)	1.12 (0.70, 1.80)	1
Palpitation	2.74** (1.61, 4.67)	2.69** (1.57, 4.61)	2.07** (1.21, 3.52)	2.03** (1.19, 3.47)	1.95* (1.12, 3.38)	1.94* (1.11, 3.38)	1
Insomnia	1.64* (1.04, 2.58)	1.67* (1.06, 2.64)	1.20 (0.77, 1.87)	1.22 (0.78, 1.90)	1.57† (0.99, 2.47)	1.57† (1.00, 2.48)	1
<i>Psychological health</i>							
Low energy	2.10** (1.35, 3.27)	2.08** (1.33, 3.25)	1.44 (0.93, 2.24)	1.43 (0.92, 2.22)	2.01** (1.28, 3.16)	2.01** (1.28, 3.16)	1
Depression	1.58 (1.00, 2.49)	1.57† (0.99, 2.48)	0.94 (0.59, 1.51)	0.94 (0.59, 1.51)	1.10 (0.68, 1.76)	1.10 (0.68, 1.76)	1
Attention	1.51† (0.98, 2.33)	1.56* (1.01, 2.42)	1.24 (0.81, 1.91)	1.27 (0.83, 1.95)	2.14** (2.36, 3.36)	2.16** (1.37, 3.39)	1
Forgetfulness	1.47 (0.91, 2.36)	1.53† (0.95, 2.48)	1.36 (0.85, 2.17)	1.39 (0.87, 2.22)	1.26 (0.78, 2.03)	1.26 (0.78, 2.05)	1
Anger	1.00 (0.64, 1.55)	0.85 (0.54, 1.35)	0.87 (0.56, 1.35)	0.77 (0.49, 1.21)	0.97 (0.62, 1.52)	0.92 (0.58, 1.45)	1

Note: ** $p < .01$, * $p < .05$, † $p < .10$; OR, odds ratio.

Table 6. Participants reporting improvements in health based on qigong experience.

		Qigong experience, years							
		0-3		4-7		8-12		≥13	
		Crude OR (95%CI)	Adjusted OR (95%CI)	Crude OR (95%CI)	Adjusted OR (95%CI)	Crude OR (95%CI)	Adjusted OR (95%CI)	Crude OR (95%CI)	Adjusted OR (95%CI)
<i>Physical</i>									
Fatigue	1	1.20 (0.72, 2.00)	1.19 (0.71, 1.99)	1.02 (0.61, 1.73)	1.06 (0.62, 1.80)	1.64 (0.93, 2.89)	1.80*	(1.01, 3.22)	
Health	1	0.98 (0.55, 1.74)	0.99 (0.55, 1.78)	1.15 (0.63, 2.09)	1.30 (0.70, 2.40)	1.68 (0.88, 3.22)	1.99*	(1.02, 3.89)	
Joint pain	1	1.37 (0.81, 2.33)	1.35 (0.80, 2.30)	1.17 (0.67, 2.04)	1.13 (0.65, 1.98)	2.00* (1.11, 3.59)	1.90*	(1.05, 3.45)	
Palpitation	1	0.83 (0.38-1.81)	0.82 (0.37, 1.80)	1.05 (0.47, 2.36)	1.11 (0.49, 2.52)	2.06 (0.80, 5.31)	2.32†	(0.88, 6.11)	
Insomnia	1	0.86 (0.46, 1.59)	0.86 (0.46, 1.59)	1.19 (0.65, 2.18)	1.26 (0.68, 2.32)	2.12* (1.08, 4.17)	2.32*	(1.17, 4.62)	
<i>Psychological health</i>									
Low energy	1	0.86 (0.46, 1.59)	0.97 (0.53, 1.77)	1.19 (0.65, 2.18)	0.83 (0.46, 1.50)	2.12* (1.08, 4.17)	1.28	(0.65, 2.55)	
Depression	1	1.14 (0.55, 2.35)	1.10 (0.53, 2.31)	0.87 (0.42, 1.81)	0.97 (0.46, 2.04)	1.68 (0.79, 3.56)	1.78	(0.82, 3.84)	
Attention	1	1.29 (0.71, 2.34)	1.26 (0.69, 2.31)	0.84 (0.46, 1.55)	0.85 (0.46, 1.58)	1.96* (1.04, 3.68)	1.95*	(1.02, 3.71)	
Forgetfulness	1	1.35 (0.71, 2.59)	1.29 (0.67, 2.49)	1.03 (0.51, 2.08)	0.97 (0.48, 1.99)	2.21* (1.14, 4.31)	2.08*	(1.06, 4.08)	
Anger	1	1.35 (0.70, 2.59)	1.53 (0.83, 2.84)	1.03 (0.51, 2.08)	1.12 (0.59, 2.12)	2.21* (1.14, 4.31)	2.85**	(1.46, 5.54)	

Note: ** $p < .01$, * $p < .05$, † $p < .10$; OR, odds ratio.

reported previously (Jones, 2006). There was a lack of effect of QiGong on insomnia, energy, and attention because the odds of perceiving these problems were similar after 0–3 after 8–12 years of QiGong practice. This lack of effect could be indicative of the presence of depression (Kvam, Kleppe, Nordhus, & Hovland, 2016). We speculate that individuals with low levels of depression started to practice QiGong, creating a potential selection bias.

Summary and concluding discussion

We determined the self-perceived health benefits of QiGong exercise and its relationship with QoL (Study 1) and examined the relationship between QiGong practice and prevalence of physical and psychological dysfunction in Japanese QiGong practitioners (Study 2).

Study 1 showed only 23% participants perceived health benefit from QiGong. In addition, the duration of QiGong practice correlated with QoL. Participants who practised QiGong for 13+ years reported to have higher QoL than those who practised for 0–3 or 8–12 years. Results from Study 2 confirm the findings of Study 1: participants pursuing QiGong for 13+ years consistently reported that they perceived improvements over the practice period in fatigue, health, joint pain, palpitation, insomnia, energy, attention, and forgetfulness. While numerous studies have examined the effects of QiGong on QoL or its elements in cancer (Larkey, Roe, Smith, & Millstine, 2016; Tao et al., 2016), psychosocial well being in old adults (Chan, Yu, & Choi, 2017), sleep (Chan et al., 2016), COPD (Zhang, Xv, Luo, Meng, & Ji, 2016), low back pain (Teut, Knilli, Daus, Roll, & Witt, 2016), and fatigue-related conditions (Li, Chan, Chow, Yuen, & Chan, 2015; McQuade et al., 2017), many of these studies reported small or mixed effects possibly due to the limited duration of the intervention. Our data suggest the presence of a duration effect on health outcomes when practice duration is extended to years instead of weeks or months (Tables 2, 5, and 6). Even those old adults who reported to have practised QiGong for up to 12 years, the self-perceived health benefits were statistically lower than the benefits reported by those who practised QiGong for 13+ years, an observation also reported in relation to the effects of physical activity on healthy old adults' motor and cognitive function (Litscher et al., 2001). All in all, our data agree with the prevailing ACSM physical activity guidelines for seniors, recommending daily physical activity of at least 30 min for as many years as possible (Nelson et al., 2007).

The present study had some limitations. First, the cross-sectional design, i.e. post-only assessment of QiGong practice could not fully explain a causal relationship between practice duration and perceived health benefits, clinical outcomes, and QoL. In addition, the effects of QiGong practice were evaluated retrospectively. Therefore, there could be a bias in recall. Longitudinal study will be needed to investigate the hypotheses of the present. Second, it was not possible to determine the frequency of QiGong practice, an important factor that can affect perceived health benefits. Third, socio-economic status (SES, income, employment) is strongly related to health condition and health behaviour (Adler et al., 1994). We did not discuss the effects of SES on health outcomes because most participants were over age 65 years and retired. Finally, our subjects were Japanese DYSG QiGong practitioners and cross-cultural differences and the style of QiGong can affect perceived health benefits.

QiGong practice affords perceived physical, psychological, and social health benefits and conversely healthy Japanese old adults also perceived that they had fewer physical and psychological dysfunctions, and higher QoL. The greatest perceived benefits occurred after 13+ years of QiGong practice with some benefits also present at a dose level of 8 years. QiGong is a multi-component form of physical activity, which – if practised for prolonged periods – affords motor, cognitive, and social benefits.

Ethical standards

Both Study 1 and Study 2 survey was conducted according to the World Medical Association Declaration of Helsinki: Ethical Principles for Medical Research Involving Human Subjects. The present study used an anonymous, blind survey. An experienced research staff constructed the questionnaire using simple-worded and mindful questions that were free of unpleasant or potentially abusive language. Participants did not write their names on the questionnaire or provide any other information that could have identified them. Participants were assured that all of the information obtained in the survey would be used for research purposes only and that the data and responses would be kept confidential. Thus, participants' confidentiality and privacy were maintained. Participants understood that filling in the survey was the act of consent.

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