

## *T'ai Chi* as Exercise Among Middle-Aged and Elderly Chinese in Urban China

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### Abstract

**Objectives:** *T'ai chi* is a form of mind–body practice used as exercise in China, though limited data are available on characteristics of *t'ai chi* users and factors associated with practice.

**Methods:** Characteristics of and factors associated with *t'ai chi* practice among middle-aged and elder Chinese in Shanghai China were analyzed utilizing baseline data from the Shanghai Women's Health Study and Shanghai Men's Health Study. Logistic regression modeling was used to identify independent factors associated with the practice of *t'ai chi* among men and women.

**Results:** *T'ai chi* is the most common form of regular exercise in Shanghai China among middle-aged and elderly persons (22%), including among women (28%) and men (15%). Other popular forms of exercise were walking (7%), dancing (4%), and jogging (3%). A majority of adults who practiced *t'ai chi* used it as their exclusive type of exercise (69%). Overall, *t'ai chi* practitioners as compared to nonpractitioners were more likely women, older, more educated, retired versus still working, and more likely to report chronic medical conditions including pulmonary, gastrointestinal, and cardiovascular conditions. *T'ai chi* activity was associated with other health behaviors including nonsmoking, consuming ginseng, and participating in other forms of physical exercise.

**Conclusions:** *T'ai chi* is the predominant form of exercise among middle-aged and elderly Chinese in urban China, particularly among those with older age and chronic medical diseases. Future research is needed to see whether *t'ai chi* has similar or different benefits than conventional forms of exercise such as walking and jogging.

### Introduction

ASIAN-BASED MIND–BODY practices consist of a group of similar practices that combine techniques of meditation, movement, and/or breathing. *T'ai chi* (also known as *taiji* or *t'ai chi chuan*) is one type of mind–body practice from China that has now become a popular form of exercise globally. The meaning of *t'ai chi chuan* translates from Mandarin as “Supreme Ultimate Fist or Boxing,” reflecting *t'ai chi's* original purpose as an “internal” martial art aimed at developing the practitioner's well-being and strength described as vital energy or *chi*. *T'ai chi* has been categorized as a low-to-moderate-intensity exercise (up to four metabolic equivalents).<sup>1</sup> In addition to providing physical activity, mind–body techniques emphasize psychological aspects of practice such as mental attention and relaxation. These cognitive components of mind–body practices may have distinctive effects from exercise, though this is an emerging area of research.<sup>2</sup>

While the national prevalence of *t'ai chi* practice in China is unknown, it is probably one of the most common forms of exercise. A population-based cohort study of women from Shanghai reported that among women who exercise, 79% reported regular *t'ai chi* practice as exercise.<sup>3</sup> A growing body of clinical research supports the use of *t'ai chi* as an adjunct treatment for various chronic medical conditions.<sup>4</sup> Among adults in the United States, *t'ai chi* use is associated with chronic medical conditions.<sup>5</sup> Further study of individuals who practice *t'ai chi* may help identify potential health benefits and inform future clinical research. The purpose of this study was to characterize sociodemographic factors, health behaviors, and medical conditions among individuals who practice *t'ai chi* in Shanghai China, utilizing data from the Shanghai Women's Health Study (SWHS) and Shanghai Men's Health Study (SMHS), two population-based prospective cohort studies.

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## Methods

### Data source

Detailed descriptions of the research methodology for these two cohort studies have been previously published.<sup>6,7</sup> The SWHS identified all women between 40 and 70 years of age living in seven geographically defined areas of urban Shanghai China as eligible participants. Eligible women were identified through administrative offices in the defined areas. Potential participants were approached at their homes by a local health worker and trained interviewer to determine interest in study participation. Interested subjects gave informed consent and completed a survey interview, and anthropometric measurements were taken. In the SMHS, an identical process was used to select and survey eligible men between the ages of 40 and 74 years who lived in eight geographically defined areas of urban Shanghai. In the SWHS, 74,941 individuals of 81,170 eligible participants completed the baseline survey between 1997 and 2000 (response rate 92.3%). Among the SMHS, 61,491 individuals of 83,049 eligible participants completed baseline data collection between 2002 and 2006 (response rate 74.0%).

Data on *t'ai chi* practice as exercise were collected along with other types of physical activity at the baseline survey for both cohort studies. The instrument used to assess physical activity has been validated for both women and men.<sup>8,9</sup> Initially, subjects were asked if they had participated in regular exercise, defined as at least once a week for at least 3 consecutive months, during the past 5 years (yes, no) prior to the survey. Subjects who reported regular exercise were then asked details regarding up to three exercises/sports, including type of exercise/sports, frequency (hours per week), and duration (years of practice) in the past 5 years.

The baseline survey for the SWHS and SMHS also collected information on the sociodemographics (age, education, income, education, work status, longest-held occupation, marital status, body-mass index [BMI]), health behaviors (smoking status, alcohol consumption, tea consumption, ginseng consumption), and chronic medical conditions of study participants. The SWHS also collected additional information related to menopausal status and time spent watching television.

### Statistical analysis

Regular *t'ai chi* practice is the primary outcome of interest for the current analyses. Analyses were performed of women and men separately, and in combination. The prevalence of *t'ai chi* was estimated as the percentage of men and women reporting regular practice. The quantity of *t'ai chi* practice is reported as the median frequency (hours/week) and duration (years) with 25th and 75th percentiles. The association of *t'ai chi* practice with sociodemographic factors, health behaviors, and chronic medical conditions was evaluated. Sociodemographic categories analyzed were sex, age (40–44, 45–49, 50–54, 60–64, or 65–70 years), BMI (<24, 24–27.9, or  $\geq 28$  kg/m<sup>2</sup>), marriage status (married, widowed, separated/divorced, and never married), educational status (none/elementary, middle school, high school, or college or higher), longest held occupation (manual workers, clerical, or professional), and current work status (currently working or retired). Data on income were collected differently between

women and men in SWHS and SMHS, respectively; women reported annual family income and men reported monthly individual income. For analyses and reporting, income was categorized into four categories for women (<10,000, 10,000–19,999, 20,000–29,999, or  $\geq 30,000$  Yuan annually per family) and men (<500, 500–999, 1000–1999, or >2000 Yuan monthly per individual) labeling income as levels 1, 2, 3, and 4, respectively. Health behaviors were examined including regular cigarette smoking (yes, no), regular alcohol consumption (yes, no), regular tea consumption (yes, no), regular ginseng intake (yes, no), and physical activity other than *t'ai chi* (yes, no). The following chronic medical conditions were grouped as a single category for analyses: diabetes, high blood pressure, coronary artery disease, myocardial infarction, chronic hepatitis, hepatocirrhosis, emphysema, chronic gastritis, asthma, stroke, and chronic bronchitis (yes, no). In addition, chronic medical conditions were grouped based on organ systems for subanalyses as follows: (1) pulmonary disease: emphysema, chronic bronchitis, or asthma; (2) gastrointestinal disease: chronic hepatitis, hepatocirrhosis, or chronic gastritis; (3) cardiovascular disease or equivalent: high blood pressure, coronary artery disease, myocardial infarction, stroke, or diabetes. The association of *t'ai chi* practice with menopausal status (pre- or postmenopausal) and TV watching ( $\leq 2$ , 3–4, or  $\geq 4$  hours/day) was also analyzed among women only.

Percentages of *t'ai chi* and non-*t'ai chi* practitioners for each sociodemographic variable were age adjusted and compared using  $\chi^2$  tests. Associations between *t'ai chi* and sociodemographics and health behaviors were analyzed using multivariable logistic regression analysis. In the analysis, a backward elimination strategy was used to build a multivariable model and factors with a *p*-value of  $\leq 0.05$  (Wald statistic) were retained. Secondary analyses were also conducted of our final model for subgroups of chronic disease (pulmonary, gastrointestinal, and cardiovascular) to detect association between *t'ai chi* and specific types of chronic conditions. Associations are reported by odds ratios and 95% confidence intervals with two-tailed statistical test. Analyses were conducted with SAS version 9.2 for Windows (SAS Institute, Cary, NC).

## Results

The prevalence among middle-aged and elderly of *t'ai chi* and other forms of physical exercise are presented by gender in Table 1. The prevalence of regular *t'ai chi* practice among all study participants in urban Shanghai was 22.4%. Women and men reported practicing *t'ai chi* at a rate of 28.2% and 15.4%, respectively. Among all study participants, *t'ai chi* was the predominant exercise followed by walking (7.4%), dancing (3.5%), and jogging (3.0%). In Table 2, the frequency (times/week) and duration (years) of *t'ai chi* practice were reported by other forms of physical activity and gender. Most *t'ai chi* practitioners used *t'ai chi* as their exclusive form of exercise (69%). Among all *t'ai chi* practitioners in the past 5 years, *t'ai chi* was practiced with a median frequency of 3.5 hours a week, and median duration of 4 years. Table 3 reports the age-adjusted characteristics of *t'ai chi* practitioners versus non-*t'ai chi* practitioners by gender. *T'ai chi* practice was more common among older individuals with a median age of 59 years (51–65 years, 25th–75th percentiles) among

TABLE 1. MOST FREQUENT FORMS OF REGULAR PHYSICAL EXERCISE BY GENDER

	Total (n = 136,433)	Women (n = 74,942)	Men (n = 61,491)
Prevalence of physical exercise (%)			
<i>T'ai chi</i>	22.43	28.16	15.44
Walking	7.42	1.34	14.83
Jogging	3.01	1.20	5.23
Dancing	3.53	5.02	1.71
Table tennis	<sup>a</sup>	<sup>a</sup>	1.27
Martial arts/ <i>kungfu</i>	<sup>a</sup>	1.10	<sup>a</sup>

<sup>a</sup>Prevalence of <1% not reported.

women and 66 years (57–71 years, 25th–75th percentile) among men. Many women and men who practiced *t'ai chi* were currently retired (53.7% and 40.4%, respectively). A large majority of *t'ai chi* practitioners reported middle incomes (levels 2 and 3). Men at the lowest income level reported infrequent *t'ai chi* practice. A statistically higher number of *t'ai chi* practitioners reported having some type of chronic medical disease (53.3% of females and 50.6% of males) as compared to non-*t'ai chi* practitioners (45.7% of females and 48.3% of males). The most frequent chronic medical conditions reported were cardiovascular (31.6% of women and 36.7% of men) and gastrointestinal diseases (25.8% of women and 18.4% of men). *T'ai chi* practitioners reported a higher prevalence of other forms of physical activity and regular ginseng use as compared to nonpractitioners.

In Table 4, factors independently associated with *t'ai chi* practice among women, men, and in combination were reported including sociodemographics, health behaviors, and chronic medical conditions. Women were more likely to practice *t'ai chi* than men. Combining both cohorts, *t'ai chi* was associated with increased age, being married versus never married or separated/divorced, higher educational status, professional versus clerical or manual occupations, and being retired. Chronic medical conditions, including pulmonary, gastrointestinal, and cardiovascular diseases, were associated with increased *t'ai chi* practice. *T'ai chi* practitioners were less likely to smoke, and more likely to report regular ginseng consumption and regular participation in other forms of exercise. Among women, postmenopausal status and watching less TV were positively associated with *t'ai chi*. Among men, chronic diseases were not associated with *t'ai chi* except for a weak positive association with cardiovascular disease.

## Discussion

*T'ai chi* is a common form of exercise among urban Chinese men and women in China, more frequent than any other forms of exercises including walking and jogging. Women and men who regularly practiced *t'ai chi* as compared to those who did not were older, more educated, and currently not working. *T'ai chi* practitioners were more likely to have chronic medical conditions including pulmonary, gastrointestinal, and cardiovascular diseases. *T'ai chi* activity was associated with other healthy behaviors including non-smoking, consuming ginseng, watching less TV, and participating in other forms of exercise.

TABLE 2. PREVALENCE OF REGULAR *T'AI CHI* PRACTICE BY OTHER PHYSICAL ACTIVITY AND GENDER

	Total (n = 136,433)		Women (n = 74,942)		Men (n = 61,491)	
	Prevalence of <i>t'ai chi</i> (%)	Hours of <i>t'ai chi</i> per week (median, 25th–75th percentiles)	Prevalence of <i>t'ai chi</i> (%)	Hours of <i>t'ai chi</i> per week (median, 25th–75th percentiles)	Prevalence of <i>t'ai chi</i> (%)	Hours of <i>t'ai chi</i> per week (median, 25th–75th percentiles)
<i>T'ai chi</i>	22.43	3.5 (2.5–7.0)	28.16	4 (3–7)	15.44	3.5 (2.5–7.0)
<i>T'ai chi</i> and other physical exercise	6.91	5.0 (3.5–7.0)	7.81	6.5 (3.5–8.5)	5.82	3.5 (2.4,7.0)
<i>T'ai chi</i> only	15.52	3.0 (2.0–5.0)	20.35	3.5 (2.5, 7.0)	9.62	3.5 (2.5–7.0)
		Years of <i>t'ai chi</i> per week		Years of <i>t'ai chi</i> per week		Years of <i>t'ai chi</i> per week
		4.0 (2–5)		3 (2,5)		5 (3–5)
		5.0 (3.0–5.0)		4.0 (2,5)		4.0 (2–5)
		3.0 (2.0–5.0)		3.0 (1–5)		3.0 (1–5)

TABLE 3. AGE-ADJUSTED CHARACTERISTICS BY T'AI CHI PRACTITIONERS AMONG CHINESE MIDDLE-AGED AND ELDERLY WOMEN AND MEN IN SHANGHAI

	Females				Males			
	T'ai chi (%) n=21,107	No t'ai chi (%) n=53,835	p-Value	Prevalence of t'ai chi practice by characteristic (%)	T'ai chi user (%) n=9496	No t'ai chi (%) n=52,004	p-Value	Prevalence of t'ai chi practice by characteristic (%)
Sociodemographics								
Age								
40-44	10.37	34.75	<0.0001 <sup>a</sup>	10.48	3.59	16.38	<0.0001 <sup>a</sup>	3.85
45-49	13.12	23.59		17.90	7.52	25.75		5.06
50-54	14.82	13.77		29.68	10.00	20.36		8.23
55-59	14.64	8.44		40.46	11.63	12.60		14.42
60-64	21.48	9.64		46.62	14.54	8.14		24.59
65-	25.57	9.81		50.54	52.73	16.76		36.48
Education								
None/elementary	20.84	22.07	<0.0001 <sup>b</sup>	44.07	5.90	7.08	<0.0001 <sup>b</sup>	27.41
Middle school	33.26	37.21		20.86	30.48	33.70		13.17
High school	29.74	27.52		24.16	35.16	36.01		11.95
College and higher	16.15	13.19		30.97	28.45	23.21		20.07
Employment status								
Employed	46.31	53.25	<0.0001 <sup>b</sup>	16.44	56.98	61.74	<0.0001 <sup>b</sup>	8.16
Unemployed/retired	53.69	46.75		40.42	43.02	38.25		26.75
Income (Yuan) <sup>c</sup>								
Level 1	14.97	16.43	0.0003 <sup>a</sup>	31.47	12.35	12.72	0.0535 <sup>a</sup>	9.07
Level 2	36.53	38.32		27.71	42.40	42.35		17.17
Level 3	29.45	27.85		27.00	35.19	35.20		16.03
Level 4	19.05	17.40		27.97	10.07	9.73		14.01
Marital status								
Married	88.87	88.57	0.1051 <sup>b</sup>	27.19	97.03	97.17	0.5617 <sup>b</sup>	15.91
Widowed	7.36	7.52		43.18	0.55	0.62		26.30
Separated/divorced	2.88	3.02		21.33	1.00	0.79		9.69
Never married	0.89	0.90		21.28	1.42	1.42		6.43
Longest held Occupation								
Housewife	0.22	0.51	<0.0001 <sup>b</sup>	24.82			<0.0001 <sup>b</sup>	
Professional	31.82	27.93		30.07	29.41	26.12		21.56
Clerical	19.67	20.98		24.49	24.31	21.70		15.12
Manual	48.29	50.58		28.61	46.28	52.18		12.44
Menopausal status								
Premenopausal	48.61	50.95	<0.0001 <sup>b</sup>	14.59	N/A	N/A	N/A	N/A
Postmenopausal	51.39	49.05		41.96				
BMI								
<18.5	2.88	3.68	<0.0001 <sup>a</sup>	22.95	3.27	4.40	0.0003 <sup>a</sup>	11.96
18.5-24.9	62.04	60.87		25.96	63.92	62.52		15.14
25-29.9	30.00	30.19		32.07	30.07	30.50		16.36
≥30	5.08	5.26		34.94	2.73	2.58		17.67
Medical conditions								
Chronic disease								
Yes	53.34	45.72	<0.0001 <sup>b</sup>	35.67	50.60	48.28	<0.0001 <sup>b</sup>	19.91
No	46.66	54.28		21.26	49.39	51.72		11.21
Pulmonary disease								
Yes	9.92	8.36	<0.0001 <sup>b</sup>	36.46	7.13	6.89	0.2689 <sup>b</sup>	23.60
No	90.08	91.64		27.36	92.87	93.11		14.84
Gastrointestinal Disease								
Yes	25.84	20.86	<0.0001 <sup>b</sup>	33.48	18.42	16.94	<0.0001 <sup>b</sup>	17.99
No	74.16	79.14		26.64	81.57	83.06		14.90
CVD or equivalent Disease								
Yes	31.64	26.87	<0.0001 <sup>b</sup>	40.31	36.73	34.30	<0.0001 <sup>b</sup>	22.12
No	68.36	73.13		23.33	63.26	65.70		11.88
Behavioral factors								
Other physical Activity								
Yes	25.69	10.44	<0.0001 <sup>b</sup>	51.53	33.17	25.48	<0.0001 <sup>b</sup>	22.45
No	74.31	89.56		23.99	66.83	74.51		12.99

(continued)

TABLE 3. (CONTINUED)

	Females				Males			
	T'ai chi (%) n=21,107	No t'ai chi (%) n=53,835	p-Value	Prevalence of t'ai chi practice by characteristic (%)	T'ai chi user (%) n=9496	No t'ai chi (%) n=52,004	p-Value	Prevalence of t'ai chi practice by characteristic (%)
Regular cigarette smoking								
Yes	2.18	3.18	<0.0001 <sup>b</sup>	30.76	60.47	71.10	<0.0001 <sup>b</sup>	11.75
No	97.82	96.82		28.09	39.53	28.90		23.89
Regular alcohol consumption								
Yes	2.30	2.18	1959 <sup>b</sup>	31.47	30.60	34.04	<0.0001 <sup>b</sup>	13.68
No	97.70	97.82		28.09	69.40	65.96		16.33
Regular tea consumption								
Yes	32.22	29.20	<0.0001 <sup>b</sup>	26.79	64.97	67.50	<0.0001 <sup>b</sup>	14.08
No	67.78	70.80		28.75	35.02	32.50		18.21
Regular ginseng intake								
Yes	35.80	26.94	<0.0001 <sup>b</sup>	38.58	37.23	31.29	<0.0001 <sup>b</sup>	20.37
No	64.20	73.06		23.78	62.77	68.71		13.08
TV (hours/day)								
≤2	30.36	29.59	<0.0001 <sup>b</sup>	28.51	N/A	N/A	N/A	N/A
3–4	49.23	48.21		28.47				
>4	20.42	22.20		27.01				

<sup>a</sup>p-Values based on  $\chi^2$  for trend.

<sup>b</sup>p-Values based on a Pearson  $\chi^2$ .

<sup>c</sup>Income levels correspond to annual family income for women (<10,000, 10,000–19,999, 20,000–29,999, ≥30,000 Yuan) and monthly income for men (<500, 500–999, 1000–1999, >2000 Yuan) labeled Income levels 1, 2, 3, and 4, respectively.

BMI, body-mass index; CVD, cardiovascular disease; N/A, not available.

Previous research has suggested that regular *t'ai chi* practice improves cardiovascular fitness.<sup>10,11</sup> *T'ai chi* is categorized as a moderate intensity exercise.<sup>10</sup> The World Health Organization recommends that adults 18 years and older should do at least 150 minutes of moderate-intensity aerobic physical activity throughout the week.<sup>12</sup> In our study population, 28% of women and 15% of men in Shanghai meet the recommended frequency of physical activity through *t'ai chi* practice alone. In addition, 7.81% of women and 5.82% men in this study population practice *t'ai chi* along with other forms of exercise.

As an imported exercise from China, *t'ai chi* is only practiced by 2.5 million people in the United States.<sup>5</sup> Characteristics of *t'ai chi* users in the United States were captured in the National Health Interview Survey.<sup>5,13,14</sup> Similar to *t'ai chi* in China, *t'ai chi* users in the United States were more likely to have higher education, but there were no associations with *t'ai chi* use and age in the United States. Individuals who use *t'ai chi* in the United States were more likely to report musculoskeletal conditions, severe sprains, or asthma, but no associations with gastrointestinal or cardiovascular disease were reported. Comparing U.S. data to the Shanghai cohorts suggests that the demographic using *t'ai chi* in China is different than that of the United States. In particular, the higher prevalence of *t'ai chi* practice among the elderly and individuals with cardiovascular disease in China, as compared to the United States, suggests that *t'ai chi* is generally considered an acceptable and beneficial exercise among more frail individuals. It is important to note that *t'ai chi* is considered a type of complementary and alternative medicine in the United States<sup>15</sup> reflecting recent historical immigration from China, whereas in China, *t'ai chi* has been practiced for thousands of years as a conventional form of exercise for mind and body.

The analyses in this study found that individuals were more likely to practice *t'ai chi* if they reported chronic medical conditions, including pulmonary and cardiovascular conditions. There is increasing though limited research to support the use of *t'ai chi* for chronic medical conditions. *T'ai chi* may help individuals with asthma or chronic obstructive lung disease by improving respiratory function.<sup>16–19</sup> Research also suggests that patients with cardiovascular disease—including those with hypertension,<sup>20</sup> congestive heart failure,<sup>19,21,22</sup> and coronary artery disease—may benefit from *t'ai chi* practice.<sup>23</sup> The long-term impact of *t'ai chi* on health of this study's cohorts of men and women with these comorbidities will need to be evaluated as follow-up time of these two cohorts increases. While *t'ai chi* has been studied for other medical conditions including stress reduction and mood disorders,<sup>24</sup> balance and fall reduction among the elderly,<sup>25</sup> and arthritis,<sup>26</sup> SWHS and SMHS did not specifically capture data regarding these conditions.

This study has several limitations. As a cross-sectional study, no causal relationships can be established. Data collected from questionnaires are potentially subject to recall bias. However, previous validation studies have been shown that the SWHS and SMHS physical activity questionnaires can capture the exercise information accurately and reliably.<sup>8,9</sup> Since this study was conducted in a single metropolitan area, Shanghai, the results may not be generalizable to other cities, particularly rural areas or regions of China, because the *t'ai chi* practice may vary. Also, generalizing results globally is difficult due to potential variations in how *t'ai chi* is practiced, perceived, or learned indigenously in China as compared to other countries. Baseline data collection for the two cohorts was conducted several years apart, and therefore direct comparison of *t'ai chi* practice between

TABLE 4. INDEPENDENT FACTORS ASSOCIATED WITH T'AI CHI PRACTICE IN SHANGHAI CHINA

<i>Sociodemographics</i>	<i>Total</i>	<i>Females Adjusted odds ratio<sup>a</sup></i>	<i>Males</i>
Sex			
Male	1.00 (reference)	N/A	N/A
Female	2.60 (2.49–2.72)		
Age			
40–44	1.00 (reference)	1.00 (reference)	1.00 (reference)
45–49	1.57 (1.49–1.67)	1.60 (1.50–1.70)	1.33 (1.16–1.51)
50–54	2.48 (2.34–2.62)	2.25 (2.09–2.43)	2.11 (1.85–2.40)
55–59	3.45 (3.25–3.67)	2.76 (2.52–3.04)	3.36 (2.95–3.82)
60–64	4.52 (4.25–4.82)	3.33 (3.03–3.67)	5.21 (4.56–5.95)
65–70	6.19 (5.80–6.60)	3.90 (3.54–4.31)	8.19 (7.21–9.32)
BMI			
< 18.5	0.76 (0.70–0.82)	0.75 (0.67–0.83)	0.77 (0.67–0.87)
18.5–24.9	1.00 (reference)	1.00 (reference)	1.00 (reference)
25–29.9	0.99 (0.96–1.02)	1.00 (0.97–1.04)	1.00 (0.95–1.05)
≥ 30	0.95 (0.89–1.01)	0.95 (0.88–1.02)	1.02 (0.88–1.17)
Menopausal status			
Premenopausal	N/A	1.00 (reference)	N/A
Postmenopausal		1.28 (1.20–1.37)	
Marital status			
Married	1.00 (reference)	1.00 (reference)	N/S
Widowed	0.95 (0.89–1.00)	0.99 (0.93–1.06)	
Separated/divorced	0.86 (0.77–0.96)	0.84 (0.75–0.94)	
Never married	0.86 (0.73–1.02)	0.89 (0.72–1.09)	
Education			
None/elementary	1.00 (reference)	1.00 (reference)	1.00 (reference)
Middle school	1.03 (0.99–1.08)	0.92 (0.87–0.97)	1.09 (1.00–1.19)
High school	1.24 (1.17–1.32)	1.04 (0.98–1.11)	1.11 (1.01–1.22)
College and higher	1.54 (1.29–1.84)	1.14 (1.06–1.23)	1.24 (1.12–1.38)
Occupation			
Housewife	N/A	0.43 (0.32–0.57)	N/A
Professional	1.00 (reference)	1.00 (reference)	1.00 (reference)
Clerical	0.95 (0.91–0.99)	0.91 (0.86–0.97)	1.04 (0.97–1.11)
Manual	0.91 (0.88–0.95)	0.93 (0.89–0.98)	0.90 (0.84–0.96)
Work status			
Working	1.00 (reference)	1.00 (reference)	1.00 (reference)
Retired	1.71 (1.65–1.77)	1.69 (1.62–1.77)	1.62 (1.53–1.74)
Family income <sup>b</sup>			
Level 1	N/S	N/S	1.00 (reference)
Level 2			1.15 (1.05–1.26)
Level 3			1.04 (0.94–1.15)
Level 4			1.01 (0.89–1.14)
Medical conditions			
Chronic disease			
Yes	1.24 (1.20–1.28)	1.32 (1.27–1.37)	N/S
No	1.00 (reference)	1.00 (reference)	
Pulmonary disease			
Yes	1.09 (1.04–1.15) <sup>c</sup>	1.13 (1.06–1.19) <sup>c</sup>	N/S
No	1.00 (reference)	1.00 (reference)	
Gastrointestinal disease			
Yes	1.21 (1.18–1.26) <sup>c</sup>	1.25 (1.20–1.30) <sup>c</sup>	N/S
No	1.00 (reference)	1.00 (reference)	
CVD or equivalent disease			
Yes	1.17 (1.13–1.21) <sup>c</sup>	1.24 (1.19–1.29) <sup>c</sup>	1.07 (1.01–1.12)
No	1.00 (reference)	1.00 (reference)	1.00 (reference)
Behavioral factors			
Regular cigarette smoking			
Yes	0.67 (0.64–0.70)	0.70 (0.63–0.78)	0.66 (0.63–0.70)
No	1.00 (reference)	1.00 (reference)	1.00 (reference)
Regular tea consumption			
Yes	N/S	1.08 (1.04–1.13)	N/S
No		1.00 (reference)	

(continued)

TABLE 4. (CONTINUED)

Sociodemographics	Total	Females Adjusted odds ratio <sup>a</sup>	Males
Regular ginseng intake			
Yes	1.41 (1.37–1.45)	1.43 (1.38–1.48)	1.34 (1.27–1.41)
No	1.00 (reference)	1.00 (reference)	1.00 (reference)
TV (hours/day)			
≤2	N/A	1.00 (reference)	N/A
3–4		0.99 (0.95–1.03)	
>4		0.86 (0.81–0.90)	
Other physical exercises			
Yes	1.89 (1.83–1.96)	2.84 (2.71–2.97)	1.11 (1.05–1.16)
No	1.00 (reference)	1.00 (reference)	1.00 (reference)

<sup>a</sup>Odds ratios (95% confidence interval) derived from separate multivariable model where chronic disease was replaced with subgroups of disease (pulmonary, gastrointestinal, and CVD) while fully adjusting for sociodemographic factors, health behaviors, and medical conditions.

<sup>b</sup>Fully adjusted model for sociodemographics factors, health behaviors, and medical conditions with *p*-value ≤0.05.

<sup>c</sup>Income levels correspond to annual family income for women (<10,000, 10,000–19,999, 20,000–29,999, ≥30,000 Yuan) and monthly income for men (<500, 500–999, 1000–1999, >2000 Yuan) labeled income levels 1, 2, 3, and 4, respectively.

BMI, body-mass index; CVD, cardiovascular disease; N/A, not available.

men and women is not possible. Despite these limitations, this represents the largest analysis of *t'ai chi* users to date.

*T'ai chi* is an important type of physical exercise in China, representing the predominate method of exercise among middle-aged and elderly Chinese men and women. A large majority of research on exercise globally has focused on conventional forms including aerobic and resistance training. As a mind-body practice with emphasis on attention, cognition, and relaxation, *t'ai chi* may have additional or different effects than other types of exercise. Additional epidemiological research of these cohorts may reveal population-level benefits to mind-body practices that will inform future health interventions.

#### Disclosure Statement

No competing financial interests exist.

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