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Short Communication

Study of Tai Chi Practice in the United States

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Abstract

Background: Tai Chi, as a traditional Chinese martial art, has gradually been modified to a mind-body practice in complementary and alternative medicine. Often referred to as "moving meditation," it has been reported to offer many health benefits. Yet, most reports about Tai Chi have compared it with other mind-body techniques at a community level and little is known about its use at a population level.

Methods: Using 2012 National Health Interview Survey (NHIS) datasets, we investigated Tai Chi practice patterns among 33,392 American adults. Associations between Tai Chi practice and individual demographic information, health behavior, and ten common health conditions were examined using a complex sample logistic regression model.

Results: About three percent of the American adults practiced Tai Chi in 2012. Significant associations were found between Tai Chi practice and many individual factors such as age, gender, race, drinking and smoking status, and some health conditions.

Conclusion: Tai Chi practice in the U. S. is related to many individual, social, and health factors. As scientific evidence for the health benefits of Tai Chi continues to grow, it is important to inform and educate American adults about Tai Chi and its potential impact on health, especially for older people.

ABBREVIATIONS

HIS: National Health Interview Survey; CDC: Centers for Disease Control and Prevention; COPD: Chronic Obstructive Pulmonary Disease

INTRODUCTION

Tai Chi is a traditional Chinese exercise that provides many health benefits such as lowering blood pressure, improving lipid metabolism, alleviating diabetes, enhancing cardio-pulmonary function, maintaining balance and bone health, amending muscle function, improving sleep, promoting mental health, and increasing general health and quality of life [1-17], Tai Chi is not very popular in the United States, but some people do practice it. Who are those people?

In the United States, seven out of ten die from chronic diseases, many of which are aggravated by physical inactivity. According to the U.S. Census Bureau, in 2010, 13 percent of the total population was age 65 and over. The older population grew from 3 million in 1900 to 40 million in 2010 and continues to increase. As people age, their options for physical activities will become fewer and fewer. Tai chi movement is slow and gentle and suits people of virtually all ages. Should policymakers promote this old exercise for its potential impact on health?

With the above questions in mind, we analyzed the 2012 NHIS data, the latest available for adult alternative medicine, and compared our results with current known evidence.

MATERIALS AND METHODS

The NHIS data collection is achieved through a complex sampling with a nonzero probability for each person. We prepared the data by merging four 2012 NHIS datasets including Sample Adult, Family, Person, and Adult Alternative Medicine. A complex sample logistic regression model was used to determine the odds of practicing Tai Chi. All data preparation and analysis were performed using IBM SPSS version 22 for Windows. We also did a literature search for clinical trials studying health benefits of Tai Chi published up to 2012, the time when NHIS survey data were collected. Our concept framework is shown in (Figure 1): Associations of Tai Chi in Health Promotion. In (Figure 1), we identified and included factors such as individual demographic information (age, sex, race, region, education, marital status, health status, and private insurance), health behaviors (smoking, drinking, and hours of sleep), and ten health conditions (heart

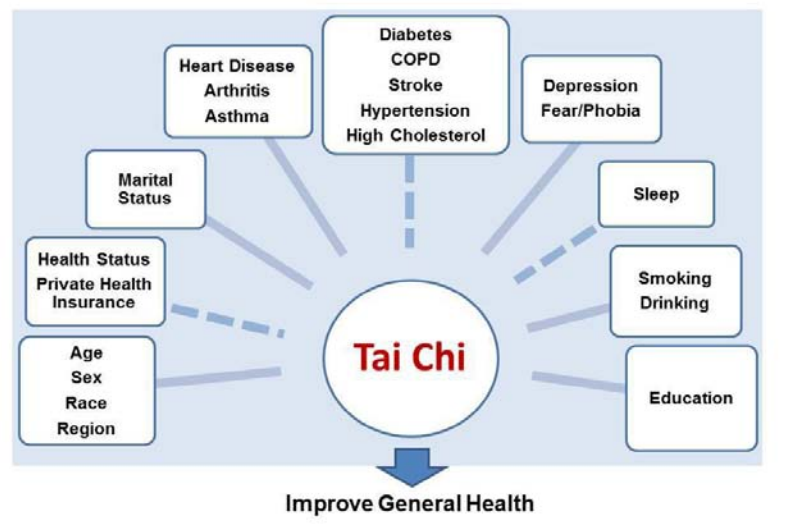

Figure 1 Associations of Tai Chi in Health Promotion.

problems, diabetes, arthritis, COPD, stroke, asthma, hypertension, high cholesterol, depression, and fear/phobia).

RESULTS

Among a total of 33,392 people, about three percent (N=1,108) specified they had ever practiced Tai Chi.

As shown in (Table 1), practicing Tai Chi was not significantly associated with either self-reported health status or insurance status. However, Tai Chi users were less likely to be younger than 50 years old, more likely to live in the West region (OR 1.69, 95% CI 1.36-2.11), to have graduate education (OR 1.84, 95% CI 1.53-2.21), to be female (OR 1.25, 95% CI 1.07-1.46), and unmarried (OR 1.26, 95% CI 1.07-1.49). In addition, Asians and people from multi-racial backgrounds were more likely to practice Tai Chi when compared with whites.

Out of the health behaviors studied, the length of sleep was not associated with the likelihood of practicing Tai Chi. Former smokers were 22% more likely to try Tai Chi than non-smokers. Both former and current drinkers were more likely to practice Tai Chi than abstainers.

In addition, people with certain health conditions were more likely to practice Tai Chi in this analysis. These conditions included heart problems (OR1.32, 95% CI 1.03-1.69), arthritis (OR 1.66, 95% CI 1.39-1.98), asthma (OR 1.22, 95% CI 1.01-1.47), depression (OR 1.52, 95% CI 1.25-1.86), and fear/phobia (OR 1.41, 95% CI 1.04-1.92). Other common health conditions including high cholesterol, high blood pressure, stroke, COPD, and diabetes were not found to be associated with practicing Tai Chi.

DISCUSSION

According to the CDC, as of 2012, about half of all adults had one or more chronic health conditions in the United States. Eighty-six percent of all health care spending in 2010 was on people with one or more chronic medical conditions. However, even with the most advanced medical technology, current standard medical treatments do not satisfy all medical needs of the chronically ill. For long-term health maintenance, integrative medicine such as Tai Chi can play a role.

In this study, we looked into Tai Chi practice in the United States to understand its use among American adults. Among the health conditions we investigated, we found that people with heart disease, arthritis, asthma, depression, and fear/phobia were more likely to practice Tai Chi, but people with diabetes, COPD, stroke, hypertension, and high cholesterol were not. Although existing scientific evidence indicates health benefits of Tai Chi in many different disorders, the associations may not predict any causal relationship either way. To find out the true relationship between Tai Chi practice and the improvement of certain chronic conditions, well designed randomized clinical trials are needed to evaluate the effect of Tai Chi on practitioners' health.

Although Tai Chi masters emphasize achieving peace through the body, mind, and respiratory adjustment, the precise physiological mechanisms of how Tai Chi works are still unclear. Many researchers have tried to study this. Geib and colleague have found changes in cytokine production following Tai Chi practice to reduce pain in some healthy Volunteers [18].

Janelsins *et al.,* have observed insulin stability and correlations of both decreased fat mass and increased fat-free mass with increased IL-6 and decreased IL-2 levels among breast cancer survivors who practiced Tai Chi [19]. Clinical trials show that practicing Tai Chi may be responsible for a significant increase in superoxide dismutase activity and total antioxidant status concentration; these are linked to the improvement of periodontal disease in older adults [20], and reduced cellular inflammatory responses and reduced expression of genes encoding proinflammatory mediators among breast cancer survivors [21], Hence, the physiological mechanisms of Tai Chi may be person and health status specific.

This study did not find self-reported health status predicting Tai Chi use despite the fact that clinical evidence has shown health benefits of Tai Chi use for the pre-frail elderly, [12] or

Table 1: Prevalence and Adjusted Odds Ratios of Tai Chi Practice among American Adults in 2012.

		Total (N=33,397), % (95%CI)	Yes (N=1,108), % (95%CI)	No (N=32,289), % (95%CI)	Odds Ratio (95%CI)
Age	<30	19.2(18.4,20.0)	12.6(10.5,15.2)	19.4(18.7,20.2)	0.59(0.44,0.79)
	30-39	16.6(16.0,17.1)	15.1(12.8,17.7)	16.6(16.1,17.2)	0.73(0.56,0.96)
	40-49	16.4(15.9,16.9)	14.7(12.5,17.2)	16.4(16.0,16.9)	0.77(0.60,0.99)
	50-59	17.5(17.0,18.1)	20.8(18.3,23.7)	17.4(16.9,18.0)	0.96(0.78,1.18)
	60+	30.3(29.6,31.0)	36.8(33.4,40.3)	30.1(29.4,30.8)	1
Sex	Male	45.3(44.7,46.0)	38.1(34.8,41.5)	45.6(44.9,46.3)	1
	Female	54.7(54.0,55.3)	61.9(58.5,65.2)	54.4(53.7,55.1)	1.25(1.07,1.46)
Race	White	80.6(79.9,81.2)	80.3(77.5,82.9)	80.6(79.9,81.2)	1
	Black	12.5(12.0,13.0)	9.3(7.5,11.5)	12.6(12.1,13.1)	0.99(0.77,1.29)
	AIAN	0.8(0.6,0.9)	0.9(0.5,1.7)	0.8(0.6,0.9)	1.22(0.62,2.37)
	Asian	4.5(4.3,4.8)	6.3(4.8,8.0)	4.5(4.2,4.7)	1.56(1.14,2.15)
	Multi	1.7(1.5,1.9)	3.2(2.3,4.5)	1.6(1.5,1.8)	1.77(1.17,2.67)
Region	Northeast	17.7(16.9,18.6)	17.3(14.4,20.7)	17.8(17.0,18.6)	1
	Midwest	23.7(22.8,24.6)	20.1(17.3,23.3)	23.8(22.9,24.7)	0.88(0.68,1.14)
	South	36.9(35.9,37.9)	26.4(23.3,29.7)	37.3(36.3,38.3)	0.82(0.66,1.02)
	West	21.7(20.9.22.6)	36.2(32.8,39.7)	21.2(20.3,22.1)	1.69(1.36,2.11)
Education	≤High School	39.2(38.4,40.0)	14.7(12.5,17.3)	40.1(39.2,40.9)	0.30(0.24,0.37)
	College Level	50.4(49.6,51.2)	62.4(59.1,65.5)	50.0(49.1,50.8)	1
	≥Graduate School	10.4(9.9,10.9)	22.9(20.2,25.8)	10.0(9.5,10.5)	1.84(1.53,2.21)
Income	<35,000	40.8(39.8,41.8)	37.4(34.2,40.7)	40.9(39.9,41.9)	1
	35,000-74,999	31.1(30.4,31.8)	31.7(28.7,34.8)	31.1(30.4,31.8)	0.88(0.72,1.06)
	>75,000	28.1(27.2,29.0)	30.9(27.9,34.1)	28.0(27.1,28.9)	0.79(0.63,1.00)
Marital Status	Married	43.9(43.0,44.7)	38.7(35.5,42.0)	44.0(43.2,44.9)	1
	Not Married	56.1(55.3,57.0)	61.3(58.0,64.5)	56.0(55.1,56.8)	1.26(1.07,1.49)
Health Status	Good/Excellent	86.2(85.7,86.6)	87.2(84.7,89.4)	86.1(85.7,86.6)	1
	Fair/Poor	13.8(13.4,14.3)	12.8(10.6,15.3)	13.9(13.4,14.3)	0.80(0.62,1.04)
Private Insurance	Yes	61.5(60.7,62.3)	64.2(60.5,67.8)	61.4(60.6,62.2)	0.93(0.77,1.13)
	No	38.5(37.7,39.3)	35.8(32.2,39.5)	38.6(37.8,39.4)	1
Sleep	<7Hours	29.8(29.2,30.4)	33.4(30.5,36.3)	29.7(29.1,30.3)	1.12(0.97,1.30)
	7-9Hours	66.2(65.6,66.8)	63.6(60.4,66.8)	66.3(65.6,66.9)	1
	≥10Hours	4.0(3.8,4.3)	3.0(1.9,4.7)	4.1(3.8,4.3)	0.91(0.55,1.48)
Drinking	Former Drinker	15.3(14.8,15.8)	14.5(12.3,17.0)	15.3(14.8,15.9)	1.88(1.40,2.53)
	Current Drinker	64.9(64.2,65.7)	76.9(73.8,79.8)	64.5(63.7,65.2)	2.48(1.91,3.22)
	Never Drink	19.8(19.1,20.4)	8.5(6.9,10.5)	20.2(19.5,20.8)	1
Smoking	Former Smoker	23.4(22.8,23.9)	31.2(28.1,34.4)	23.1(22.5,23.6)	1.22(1.01,1.47)
	Current Smoker	18.7(18.2,19.3)	15.6(13.3,18.1)	18.8(18.3,19.4)	0.96(0.76,1.21)
	Never Smoke	57.9(57.2,58.6)	53.3(49.8,56.8)	58.1(57.4,58.8)	1
Heart Disease	Yes	7.6(7.3,8.0)	11.7(9.5,14.3)	7.5(7.2,7.8)	1.32(1.03,1.69)
	No	92.4(92.0,92.7)	88.3(85.7,90.5)	92.5(92.2,92.8)	1
Diabetes	Yes	11.0(10.7,11.4)	10.9(9.1,13.1)	11.1(10.7,11.5)	0.88(0.67,1.16)
	No	89.0(88.6,89.3)	89.1(86.9,90.9)	88.9(88.5,89.3)	1
Arthritis	Yes	24.3(23.7,24.9)	37.5(34.4,40.7)	23.8(23.2,24.4)	1.66(1.39,1.98)
	No	75.7(75.1,76.3)	62.5(59.3,65.6)	76.2(75.6,76.8)	1
COPD	Yes	3.3(3.0,3.5)	4.1(2.8,6.0)	3.2(3.0,3.5)	0.89(0.56,1.41)
	No	96.7(96.5,97.0)	95.9(94.0,97.2)	96.8(96.5,97.0)	1

Stroke	Yes	3.1(2.9,3.3)	3.5(2.4,5.3)	3.1(2.9,3.3)	0.96(0.60,1.53)
	No	96.9(96.7,97.1)	96.5(94.8,97.6)	96.9(96.7,97.1)	1
Asthma	Yes	12.7(12.3,13.2)	17.5(15.2,20.0)	12.6(12.1,13.0)	1.22(1.01,1.47)
	No	87.3(86.8,87.7)	82.5(80.0,84.8)	87.4(87.0,87.9)	1
Hypertension	Yes	32.4(31.8,33.1)	35.8(32.6,39.2)	32.3(31.6,33.0)	1.03(0.86,1.22)
	No	67.6(66.9,68.2)	64.2(60.8,67.4)	67.7(67.0,68.4)	1
High Cholesterol	Yes	28.0(27.4,28.6)	34.0(30.8,37.4)	27.8(27.2,28.4)	0.98(0.82,1.18)
	No	72.0(71.4,72.6)	66.0(62.6,69.2)	72.2(71.6,72.8)	1
Depression	Yes	15.4(14.9,15.9)	25.5(22.6,28.5)	15.0(14.6,15.5)	1.52(1.25,1.86)
	No	84.6(84.1,85.1)	74.5(71.5,77.4)	85.0(84.5,85.4)	1
Fear/Phobia	Yes	5.4(5.1,5.7)	9.2(7.3,11.6)	5.3(5.0,5.6)	1.41(1.04,1.92)
	No	94.6(94.3,94.9)	90.8(88.4,92.7)	94.7(94.4,95.0)	1

Abbreviations: COPD: Chronic Obstructive Pulmonary Disease

the transitionally frail [13,15]. We did not find that people with fair or poor health status were more likely to practice Tai Chi in the United States in 2012. Several factors may contribute to this. Sicker patients may perceive Tai Chi as a strenuous physical activity as it may appear to be. Another factor is that Tai Chi classes may not be easily accessible. It is also possible that once people reach a frail status, they may become more and more dependent on current standard medical treatment as it often promises a quick fix.

Moreover, education plays a significant role in practicing Tai Chi in this study. Compared with people with a college education, people who have less than a high school education were 70% less likely to use Tai Chi, but people with graduate degrees were 84% more likely to practice. Higher education may enhance many aspects of people's decision making from gathering health information to attempting new ways for health improvement. Future research may investigate associations between education level and people's likelihood to try new things for health maintenance.

Our study also has several limitations. First, our results relied on a self-reported survey that may involve recall bias and inaccuracy. Second, Tai Chi has many styles and different ways of practice. Its effects are inevitably associated with practice duration, intensity, level of mastery, commitment, and willingness to change other aspects of life. Moreover, practicing Tai Chi as a group offers an opportunity to socialize. If driven by different purposes and practicing in different environment, people may receive different health benefits. Unfortunately, the current survey data did not provide these important factors for analysis. Future studies should incorporate these factors and evaluate their effects on health in a more culture and technique conscious manner.

This study may not provide sufficient evidence to launch a public health campaign to promote Tai Chi; however, it reveals more details about current Tai Chi practice and health condition associations. It encourages us to further explore Tai Chi's potential as a beneficial mind-body exercise. Better designed clinical trials will help us to understand what Tai Chi can do for our health.

CONCLUSION

Tai Chi practice in the U. S. is related to many individual, social, and health factors. As the U.S. population is aging and becoming increasingly inactive, [22] older people have fewer and fewer options for physical exercise. Here, we propose both in-depth research regarding how Tai Chi works, and public health education programs to increase awareness and access of Tai Chi, which may become a game changer for many people.

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