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Research Article

A Pilot Feasibility and Acceptability Study of a Tai Chi Exercise Intervention on Smoking Cessation

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Abstract

Background: Tobacco use is still the number one cause of morbidity and mortality in the United States and contributes to approximately $156 billion in annual lost productivity. Approximately 480,000 deaths are attributable to smoking and tobacco use each year. In 2011, a poll conducted by the CDC concluded that 69% of adult smokers wanted to quit smoking.

Objective: This study assessed the effect of a Tai Chi exercise intervention to treat smoking addiction. Secondary outcome measures included quality of life, self-reported stress, and physical characteristics.

Methods: Eighteen participants who regularly smoked cigarettes were enrolled in a 12-week group intervention. Participants attended 3 Tai Chi sessions per week for 3 months. They were assessed on their current tobacco use and other outcomes at three time points (baseline, post-intervention, and 3-month follow-up).

Results: At post-intervention, 11 out of 12 participants had reduced their level of smoking and 7 (58%) were no longer smoking. At the 3-month follow-up, three of the four (75%) active participants reported no longer smoking. Pairwise comparisons revealed that the smoking rate at baseline was significantly higher than at post-intervention ($p<0.001$) and at 3-month follow-up ($p<0.05$). According to quality of life, role-physical ($p<0.01$), general health, vitality, social functioning, role-emotional, and bodily pain (all p values<0.05) improved at post-intervention, 3-month follow-up, or both. Systolic blood pressure decreased at the 3-month follow-up assessment ($p<0.05$).

Conclusions: Our findings suggest that Tai Chi is effective for helping participants either stop smoking or reduce their habit and also improves systolic blood pressure and self assessment of multiple quality of life domains. Thus, Tai Chi may offer an alternative method for smoking cessation, while simultaneously improving other indicators of overall health status.

Keywords: Cigarette Use; Smoking Cessation; Tai Chi; Quality of Life.

Introduction

Tobacco use is still the number one cause of morbidity and mortality in the United States and contributes to approximately $156 billion in annual lost productivity [1]. Almost 480,000 deaths, e.g., heart attack, stroke, cancer, chronic obstructive pulmonary disease, and other conditions, are attributable to smoking and tobacco use [1,2]. The prevalence of smoking has dropped considerably since the first United States Surgeon General's report in 1964 that detailed the dangers related to smoking. However, roughly a quarter of the American population continues to smoke,

and an increase in youth smoking in the 1990s resulted in a stable number of adults that still smoke today. Although the epidemic of obesity is quickly approaching the impact of tobacco use, smoking still remains the number one public health priority for applying effective interventions to reduce or eliminate its effect on society. Multiple smoking cessation strategies are available for those individuals who want to quit. Brief counseling and behavior therapy in individual or group format have been utilized with greater in-person and intense contact shown to be somewhat effective [3]. Exercise has also been implemented as a smoking cessation strategy and has shown minimal utility [4], due to lack of compliance [5]. However, one study showed that depressed smokers could be consistently engaged in an exercise program [6]. Smoking cessation is beneficial for smokers at any age and will lower the risk of lung and other cancers, cardiovascular disease, respiratory illness, and pulmonary function [7,8]. Additionally, approximately 69% of adult smokers want to stop smoking, and 43% of those smokers had made a quit attempt in the past year [1]. Unfortunately, quitting tobacco use is not easy or simple. It typically requires repeated attempts to succeed, and because of significant withdrawal symptoms such as irritability, anxiety, difficulty concentrating, and increased appetite, it can result in relapse [9,10].

Consistent and progressive exercise has been repeatedly shown to reduce the risk of a host of chronic diseases and improve feelings of well-being and mental health [11-14]. Mind-body exercise, such as Tai Chi, has been found to improve psychological and emotional status and reduce stress. A review of the Tai Chi literature shows specific benefits have been reported for balance and strength, cardiovascular and respiratory functioning, flexibility, immunological functioning, and symptoms of arthritis [15]. Tai Chi has also been shown to attenuate aging-associated declines in physical functioning. This form of exercise can be utilized for persons with cardiovascular, orthopedic, and neurological diseases and has been used to reduce the risk of falls in the elderly [16]. Another study found that participants who attended a one-hour Tai Chi exercise class three times per week had significant improvements in all measures of psychosocial status, including mood, perceived stress, self-efficacy to overcoming barriers, confidence in performing Tai Chi, and perceived social support, after 12 weeks [17]. Among older women with osteoarthritis, Tai Chi was shown to be safe for 12 weeks and effective in improving arthritis symptoms, balance, and physical functioning compared to the control group [18].

Despite the voluminous number of studies on smoking cessation, targeting primarily pharmacological agents or behavioral strategies, we are aware of no previous study that has assessed the effect of a Tai Chi exercise program on the primary outcome of smoking cessation with quality of life, subjective stress, physical characteristics, and self-reported physical activity level as secondary outcomes. Tai Chi potentially offers many health benefits and is appropriate for addressing a wide variety of physiological and psychosocial conditions at once, given its mind-body focus. In addition, this type of intervention provided to the participants is likely to be significantly different from what is typically offered to smokers who want to quit smoking. Therefore, Tai Chi may demonstrate to be an effective intervention for smoking cessation, while simultaneously improving the mental and physical status of the participants.

Material and Methods

Study Participants: The study was conducted with the approval of the University of Miami Institutional Review Board for human subjects research. Each subject signed informed consent and HIPAA forms prior to study entry. Potential participants were identified through referrals from advertisements at the University of Miami during August 2008 to September 2009. Out of 30 eligible participants, 18 were enrolled in the program. Twelve subjects decided not to participate in the study either at the initiation of the first group session or shortly thereafter.

Study Design: Participants were enrolled into a one-group clinical trial to assess the efficacy of Tai Chi performed 3 times per week for 12 weeks on smoking cessation, quality of life, subjective stress, physical characteristics, and self-reported physical activity in adult smokers. After the program, participants were offered a booster session once per week for an additional 12 weeks.

Inclusion Criteria were: (a) 18+ years of age; (b) English speaking; (c) currently smoking at least five cigarettes per day; (d) interested in smoking cessation and willing to follow program recommendations; (e) able to participate in the study for 24 weeks; and (f) willing to provide informed consent.

Exclusion Criteria were: (a) currently participating in another behavioral or medical intervention to stop smoking; (b) women who were pregnant or attempting to get pregnant; (c) other medical complications that would have precluded participation in the study, e.g., orthopedic conditions that limit exercise; or (d) a score ≥29 on the Beck Depression Inventory-II (BDI) [19].

Screening: All potential participants were screened for the eligibility criteria. As depression may affect compliance to an exercise protocol [20] and poor adherence to health recommendations [21], and thus lead to poor performance on outcome measures, participants were also evaluated using the BDI.

Intervention Protocol: If all screening criteria were achieved, participants were enrolled in the 12-week Tai Chi for Health program three times per week for one hour at each session. They learned the 12-movement Sun-Style Tai Chi that combines didactic and psychosocial (e.g., cognitive-behavioral and social learning) procedures to improve their ability to perform Tai Chi in a positive, enjoyable, supportive, and interactive environment. Specific procedures in the program, such as eliminating negative cues

and exercising with a partner, were designed to produce positive changes in smoking status and to decrease other disease risk factors. After the first 12-week phase of the program, once weekly booster sessions for an additional 12 weeks were provided to the participants to ensure compliance with the program, sustain rapport between the group participants, and to have a mechanism for continued, regular follow-up. All participants were encouraged to attend the booster sessions to reinforce the intervention. To ensure group integrity, the same group membership for the intervention phase was utilized during the maintenance phase. Subsequent individual reinforcement of standard lifestyle recommendations occurred at the scheduled weekly sessions. During the course of the intervention, subjects were not advised to modify eating or other physical activity habits or prescription medication or dietary supplement use.

Outcomes and Assessments: Each participant completed a basic sociodemographics and medical history questionnaire and reported their list of medications at baseline. All outcomes were assessed at three time points (baseline, post-intervention, and 3-month follow-up) and required approximately one hour to complete.

Smoking Status: The primary outcome of this study was self-reported smoking status. Subjects were asked to report how many packs of cigarettes per day they were smoking.

Quality of Life: The Medical Outcomes Study Short Form 36 (SF-36) was used to assess health-related quality of life, as it is arguably the mostly widely used and validated functional measure [22]. The SF-36 provides eight different scales with a t-score for each scale ranging from 0-100, and higher scores represent better perceived quality of life. It is a generic measure that does not target a specific age, disease, or treatment group.

Psychosocial Stress: The Brief Symptom Inventory-18 (BSI-18) was designed for both reliability and brevity and was appropriate for our assessment battery to reduce the response burden on the subjects [23]. The BSI-18 provides scales of somatization, depression, and anxiety and an overall index of global severity. This measure has been used to assess subjects for psychological problems, measure subject progress during and after treatment to monitor change, and provide outcomes measurement for interventions.

Physical Characteristics: Body fat percentage was estimated using a Lange skinfold caliper (for men - triceps, chest, and subscapular and for women - triceps, abdomen, and suprailiac). The values of the 3 sites were summed, and then based on the subject's age a percentage of body fat was estimated. Weight and height were recorded to the nearest 0.1 kg and 0.1 cm, respectively, and were utilized to calculate body mass index (BMI). Waist circumference was measured at the narrowest circumference halfway between the lowest rib and the iliac crest (to the nearest 0.1 cm). Hip circumference was measured at the level of the anterior superior iliac spine or otherwise at the broadest circumference below the waist (to the nearest 0.1 cm). The relationship between the two values was used to calculate waist-to-hip ratio (WHR). Systolic blood pressure (SBP), diastolic blood pressure (DBP), and heart rate (HR) were measured to the nearest even digit by use of a random-zero sphygmomanometer (Mabis, IL). Three readings were made with the subject seated after five minutes of rest. The average of the second and third readings was used in the analysis. Cardiovascular fitness was assessed by the six-minute walk test.

Statistical Analysis: Data were analyzed using SPSS 22 (IBM Inc., Chicago, IL) for Windows. Frequency and descriptive statistics were calculated on all variables. Analysis of variance and chi square were utilized to determine the presence of differences in background contextual variables. We utilized linear mixed modeling (LMM) to assess the fixed effect of time on changes in our outcome variables from baseline to 3 months follow-up. If the type III test of the fixed effect of time was significant, then we used pairwise comparisons to determine the unique differences in effects over time among baseline, post-intervention, and 3-month follow-up for the outcome variables. LMM with heterogeneous compound symmetry covariance allowed us to account for subject attrition, inter-correlated responses between time points, and non-constant variability. The criterion for statistical significance was $\alpha = 0.05$.

Results

Safety, Feasibility, and Demographics: No adverse events were reported by any subject. Demographic characteristics of the participants (n=18) are presented in Table 1. The feasibility of the study was modestly supported with an overall Tai Chi session attendance rate of 54%, the median session attendance rate was 60%, and the range was 8-98%.

Table 1. Sociodemographic Characteristics of the Study Participants

Variable	Category	Total Sample (n=18)
Age	-	M = 43.4 (SD = 12.0; R = 26, 69)
Gender	Male Female	9 (50) 9 (50)
Race/Ethnicity	White, Caucasian African-American Hispanic Asian or Pacific Islander	5 (27.8) 1 (5.6) 11 (61) 1 (5.6)
Education	Some college/associates degree College graduate Master's degree Doctorate Degree	8 (44.4) 6 (33.3) 2 (11.1) 2 (11.1)
Employment	Employed full-time Employed part-time Unemployed, not retired Other	14 (77.8) 2 (11.1) 1 (5.6) 1 (5.6)
Household Income	Less than $5,000 $30,000-$39,999 $40,000-$49,999 $50,000-$59,999 $70,000 or more	1 (5.6) 2 (11.1) 3 (16.7) 4 (22.2) 8 (44.4)

NOTE: For Age, M=mean; SD = standard deviation; R = range; For all other variables n(%)

Smoking Status: At the baseline assessment, on a daily basis, 7 participants were smoking less than ½ pack of cigarettes, 7 were smoking ½ to 1 pack of cigarettes, and 4 were smoking 1 to 1.5 packs of cigarettes. At post-intervention, 6 subjects had dropped out of the study. Of the 12 remaining subjects, 7 (58%) were no longer smoking, 4 (33%) were smoking less than ½ pack, and only 1

individual (8%) continued to smoke the same amount of ½ to 1 pack. Overall, 11 of the 12 subjects had reduced their level of smoking, if not stopped entirely, and the one subject who had not reduced his amount had stayed at the same level. At 3-month follow-up, 4 subjects were still participating in the study with 3 of those no longer smoking (75%) and 1 smoking ½ to 1 pack (25%). A significant fixed effect was found for time ($F[2,6.1]=26.7$, $p=0.001$), and the parameter estimate between baseline and 3-month follow-up was also significant ($t[5.0]=3.6$, $p<0.05$). Pairwise comparisons revealed that smoking rate at baseline was significantly higher than at post-intervention (mean difference=1.3; SE=0.2; 95% CI: 0.9, 1.7; $p<0.001$) and at 3-month follow-up (mean difference=1.3; SE=0.4; 95% CI: 0.4, 2.2; $p<0.05$).

Quality of Life: Table 2 shows the descriptive values of all eight scales on the SF-36 at baseline, post-intervention, and 3-month follow-up. For physical functioning and mental health, the fixed effect for time was non-significant. For role-physical, a significant fixed effect was found for time ($F[2,15.5]=5.5$, $p<0.05$), and the parameter estimate between baseline and 3-month follow-up was also significant ($t[19.6]=-3.1$, $p<0.01$). Pairwise comparisons revealed that role-physical did not change from baseline to post-intervention (mean difference=-0.5; SE=5.5; 95% CI: -12.4, 11.3; $p=0.92$), but was significantly higher at 3-month follow-up compared to baseline (mean difference=8.7; SE=2.8; 95% CI: 2.9, 14.5; $p<0.01$). For general health, a significant fixed effect was found for time ($F[2,21.2]=13.3$, $p<0.001$), and the parameter estimate between baseline and 3-month follow-up was also significant ($t[21.7]=-5.1$, $p<0.001$). Pairwise comparisons revealed that general health significantly increased from baseline to post-intervention (mean difference=11.7; SE=4.9; 95% CI: 1.2, 22.1; $p<0.05$) and from post-intervention to 3-month follow-up (mean difference=11.8; SE=5.3; 95% CI: 0.8, 22.9; $p<0.05$). For vitality, a significant fixed effect was found for time ($F[2,10.8]=4.0$, $p=0.05$), and the parameter estimate between baseline and 3-month follow-up was also significant ($t[6.6]=-2.8$, $p<0.05$). Pairwise comparisons revealed that vitality was not different from baseline to post-intervention (mean difference=2.2; SE=5.8; 95% CI: -10.3, 14.8; $p=0.70$), but increased from baseline to 3-month follow-up (mean difference=15.0; SE=5.4; 95% CI: 2.2, 27.8; $p<0.05$). For social functioning, a significant fixed effect was found for time ($F[2,58.1]=4.3$, $p<0.05$), and the parameter estimate between baseline and 3-month follow-up was also significant ($t[33.1]=-2.4$, $p<0.05$). Pairwise comparisons revealed that social functioning was not different from baseline to post-intervention (mean difference=-1.4; SE=2.7; 95% CI: -6.8, 4.0; $p=0.60$), but increased from baseline to 3-month follow-up (mean difference=5.6; SE=2.3; 95% CI: 0.8, 10.3; $p<0.05$). For role-emotional, a significant fixed effect was found for time ($F[2,9.1]=4.8$, $p<0.05$), and the parameter estimate between baseline and 3-month follow-up was also significant ($t[18.3]=-2.4$, $p<0.05$). Pairwise comparisons revealed that role-emotional did not change from baseline to post-intervention (mean difference=-3.0; SE=6.8; 95% CI: -18.2, 12.1; $p=0.67$), but was significantly higher at 3-month follow-up compared to baseline (mean difference=6.9; SE=2.8; 95% CI: 1.0, 12.9; $p<0.05$). For bodily pain, a trend was found for time ($F[2,21.3]=3.3$, $p=0.06$), and the parameter estimate between baseline and 3-month follow-up was significant ($t[20.8]=-2.5$, $p<0.05$). Pairwise comparisons revealed that bodily pain did not change from baseline to post-intervention (mean difference=4.3; SE=4.8; 95% CI: -5.9, 14.5; $p=0.38$), but it was significantly higher at 3-month follow-up compared baseline (mean difference=9.3; SE=3.6; 95% CI: 1.7, 16.8; $p<0.05$).

Table 2. Quality of Life on the SF-36 at Baseline, Post-Intervention, and 3-Month Follow-up

Scale	Baseline (n=18)	Post-Intervention (n=12)	3-Month Follow-up (n=4)
Physical Functioning	87.8±13.4 (55, 100)	91.3±13.9 (60, 100)	99±10.8 (85, 115)
Role Physical Functioning	90.3±10.8 (75, 100)	90.1±17.8 (50, 100)	98.8±2.8 (93.75, 100)
General Health	63.5±20.0 (24, 87)	75.5±22.6 (27, 100)	88±11.9 (67, 97)
Vitality	65.3±13.6 (43.75, 87.5)	67.2±20.3 (18.75, 87.5)	81.3±11.7 (68.75, 100)
Social Functioning	94.4±10.7 (62.50, 100)	91.7±11.1 (75, 100)	100±0 (100, 100)
Role Emotional Functioning	93.1±12.2 (58.33, 100)	90.3±12.7 (66.67, 100)	100±0 (100, 100)
Mental Health	79.7±10.5 (55.0, 100)	76.8±19.5 (35, 95)	86±8.2 (80, 100)
Bodily Pain	75.4±15.6 (41, 90)	78.3±20.9 (22, 90)	85.2±7.8 (72, 90)

NOTE: Values are mean ± standard deviation (minimum, maximum).

Psychosocial Stress: For the BSI-18, the fixed effect for time was non-significant. The mean score at baseline was 4.9 (SD=6.3), the mean score at post-intervention was 3.8 (SD=2.6), and the mean score at 3-month follow-up was 3.0 (SD=2.0).

Physical Characteristics: Table 3 displays the descriptive values of all physical characteristics at baseline, post-intervention, and 3-month follow-up. For DBP, HR, weight, BMI, waist and hip circumferences, WHR, and the six-minute walk, the fixed effect for time was non-significant. For SBP, a trend was found for time ($F[2,19.3]=3.3$, $p=0.06$), and the parameter estimate between baseline and 3-month follow-up was significant ($t[19.8]=2.4$, $p<0.05$). Pairwise comparisons revealed that SBP significantly decreased from baseline to 3-month follow-up (mean difference=9.8; SE=4.2; 95% CI: 1.1, 18.5; $p<0.05$). For body fat percentage, a significant fixed effect was found for time ($F[2,11.6]=4.1$, $p=0.04$), and the parameter estimate between baseline and 3-month follow-up was marginally significant ($t[10.7]=1.9$, $p=0.08$). Pairwise comparisons revealed that body fat percentage was non-significantly lower from baseline to post-intervention (mean difference=-0.8; SE=0.7; 95% CI: -2.3, 0.8; $p=0.30$), but significantly increased from post-intervention to 3-month follow-up (mean difference=3.5; SE=1.3; 95% CI: 0.7, 6.2; $p<0.05$).

Table 3. Physical Characteristics at Baseline, Post-Intervention, and 3-Month Follow-up

Characteristic	Baseline (n=18)	Post-Intervention (n=12)	3-Month Follow-up (n=4)
Weight	162.8±35.2 (115, 252)	164.0±33.0 (117, 243)	169.8±31.7 (141, 222)
Body Mass Index	26.7±5.5 (19.8, 37.6)	27.2±5.6 (20.8, 36.0)	27.8±6.5 (21.3, 35.9)
Systolic Blood Pressure	130.4±18.8 (100, 164)	125.3±10.9 (104, 140)	118.4±6.1 (112, 128)
Diastolic Blood Pressure	81.6±12.8 (62, 108)	79.5±8.1 (64, 92)	77.6±5.0 (70, 82)
Heart Rate	82.2±9.7 (72, 108)	80.2±8.7 (66, 96)	84.4±14.1 (72, 108)
Percent Body Fat	23.5±6.6 (10.7, 32.3)	21.7±7.7 (10.2, 34.2)	24.7±11.0 (9.4, 37.2)
Hip Circumference	38.6±3.7 (33.13, 45)	38.9±3.9 (34.25, 45.25)	39.9±5.2 (33.5, 47.5)
Waist Circumference	34.3±4.8 (24,75, 43.00)	33.1±4.7 (25.00, 31.50)	34.8±4.5 (31.5, 42.0)
Waist-to-Hip Ratio	.87±.08 (.73, .98)	.85±.08 (.71, .95)	.87±.04 (.83, .94)
Six Minute Walk Test	10.7±2.2 (7.1,15.8)	9.7±4.3 (0, 16)	10.2±0.9 (9, 11)

NOTE: Values are mean ± standard deviation (minimum, maximum).

Discussion

In this study, we implemented a Tai Chi intervention to assess its effectiveness and feasibility as a strategy to help smokers who want to quit, given the difficulties associated with smoking cessation. At the post-intervention assessment, all but one (92%) subject had reduced their cigarette usage and seven (58%) had stopped smoking entirely. At the 3-month follow-up assessment, three of the four remaining study subjects reported no longer smoking. These results suggest that a Tai Chi intervention might serve as a therapy to facilitate smoking cessation. In addition to smoking cessation, we noted positive changes in quality of life, subjective stress, and physical characteristics.

Our improvements in quality of life, according to the SF-36, are consistent with previous studies that showed Tai Chi to be effective for improving multiple physical and emotional domains of health [15,16,17]. This is of particular interest because an improvement in emotional well-being may indirectly aid in the cessation of smoking. The mental improvements we found might have influenced our participants to manage their behaviors and thoughts toward stressors in a different manner, other than reaching for a cigarette. Thus, the current results suggest that not only were our participants reducing cigarette use, but that they were subjectively associating those changes with how they felt in various domains.

Additionally, we showed a significant reduction in SBP at the 3-month assessment. Given the link between smoking and hypertension and the enormous public health and financial burdens due to hypertension [24,25], the ability of Tai Chi to reduce blood pressure with no side effects is important on multiple levels.

Approximately 69% of adult smokers want to quit, but breaking the addiction to tobacco is an arduous task for most individuals to undertake [1]. It generally requires several attempts of quitting to finally achieve smoking cessation if at all. Previous research on other smoking cessation interventions shows limited efficacy. Generally, pharmacological interventions are more effective compared to psychological-behavioral therapies, but the efficacy of both types of interventions is limited [3,26]. Several studies have examined alternative therapies to smoking cessation, such as acupuncture and hypnosis, but they did not demonstrate significant effectiveness [27,28]. Thus, continued efforts will be necessary to find novel and innovative therapies that are more effective than what is currently offered to smokers.

A recent case study examined three individuals who attributed their own smoking cessation to the awareness and mindfulness-enhancing benefits of Tai Chi [29]. The authors noted that these Tai Chi classes were part of a general health and wellness program and were not tailored toward smoking cessation. The fact that smoking cessation occurred was an unexpected by-product of practicing Tai Chi for a general education requirement for two of the subjects. The authors speculated that the meditative and consciousness-raising aspects of Tai Chi were responsible for smoking cessation. Perhaps if Tai Chi is specifically tailored toward smoking cessation, such as our 12-week program, it might be more effective in treating an addiction compared to practicing a more general Tai Chi program.

Our study implemented a 12-movement Sun-Style Tai Chi program that was modified for smoking addiction. We chose to use Sun-Style Tai Chi instead of other widely used forms because this type of Tai Chi incorporates slower fluid movements, while omitting the more physically demanding movements found in others. The program was tailored to smoking cessation by placing a focus on the participants' breathing cycle. The participants were instructed to be mindful of their exhalations during the Tai Chi movements. Becoming more aware of breathing during the Tai Chi sessions would hopefully extend to everyday life. The goal was to make participants more aware of the feeling of exhaling natural air versus air filled with tobacco smoke. We anticipated that the increased awareness of smoke in their lungs and airways would serve as the primary negative cue that would help participants recognize the nature of the unhealthy behavior of smoking.

Several limitations inhibit the interpretation of our study. This study had a small sample size. We enrolled eighteen participants in this study, but six participants dropped out prior to the post-intervention assessment, and only four participants were assessed during the 3-month follow-up. A larger sample size may result in more significant findings for smoking cessation, quality of life, and physical characteristics. A larger sample size may also reduce the attrition rate experienced in this study, given the camaraderie and supportive nature that were developed among our study participants. We were also limited to a one-group intervention with no control or comparison condition. Finally, we did not measure cotinine, an objective marker of tobacco use, rather than relying only on self-reported smoking.

Conclusion

In summary, the results of this study suggest that Tai Chi may be an effective therapy for smoking cessation. Individuals that have the desire to quit smoking, but have unsuccessfully tried conventional therapies, may find a structured Tai Chi program useful to help them achieve their goal of cessation. Additionally, the quality of life and SBP improvements will augment the overall health status of those who participate in this type of program. More studies are required to assess the effectiveness of the use of Tai Chi, alone or complementary to other treatments, in a smoking cessation intervention. Our pilot study provides an encouraging step knowing that alleviating tobacco addiction is critically important for reducing the personal and national burden, which continues to be the number one public health threat in the United States.

More studies are required to assess the effectiveness of Tai Chi for smoking cessation. If additional studies support the findings of our work, then exploring the underlying mechanism of the intervention would be worthwhile. Other movements within Sun-Style and completely different Tai Chi forms could be addressed to further explore its use in the context of smoking cessation. Based on the current results, Tai Chi may also be beneficial for other addictions.

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Abbrevations

HIPAA: Health Insurance Portability and Accountability Act;
BDI: Beck Depression Inventory-II;
SF-36: The Medical Outcomes Study Short Form 36;
BSI-18: The Brief Symptom Inventory-18;
kg: kilogram; cm: centimeter;
BMI: Body Mass Index;
SBP: Systolic Blood Pressure;
DBP: Diastolic Blood Pressure;
HR: Heart Rate;
SPSS: Statistical Package for the Social Sciences;
LMM: Linear Mixed Modeling;
SE: Standard Error;
CI: Confidence Interval;
SD: Standard Deviation;
WHR: waist-to-hip ratio

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