



## Feature Article

# Proto Tai Chi: In search of a promising group exercise for the frail elderly

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## ABSTRACT

### Keywords:

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The purpose of this study was to conduct a pilot evaluation of a Proto Tai Chi exercise program for older adults and gain insight into the design of future trials involving those who are physically and cognitively frail. Proto Tai Chi (aka Wu Qin Xi) is a simple and intuitive Chinese exercise from which Tai Chi evolved. Twenty-four older adults ( $74.2 \pm 7.5$  years, range 65–92) participated in a 5-day, 90-minute/day structured evaluation of a Proto Tai Chi exercise program. Mean completed exercise time by participants per protocol was 98.6%. Participants reported the program to be enjoyable and beneficial. Preliminary efficacy of the program was supported by improvement in measures of walking speed and range of motion at post-test. Results indicate that Proto Tai Chi is a well-accepted exercise option for older adults that may improve physical function and mobility. These preliminary findings merit further investigation in the frail elderly.

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## Introduction

Increased life expectancy creates a global challenge for a growing number of older adults living with co-morbidities. Proportionally, this will lead to an increase in the physically and cognitively frail adult population, who are at risk of poor health outcomes.<sup>1–3</sup> Frailty is a clinical syndrome which predisposes older adults to extreme vulnerability, disability and death.<sup>1,4–7</sup> Prevalence rates of frailty in community-dwelling elderly are reported between 4% and 59%.<sup>6,8</sup> Those with frailty, even to a mild degree, have higher risk of admission to long-term care than non-frail individuals.<sup>6</sup> Frailty level and rate of change are also associated with the trajectory of cognitive decline and incipient Alzheimer's disease (AD).<sup>9,10</sup> The rising population of older adults living with co-morbidities and frailty has created a major health care burden for the United States in recent decades.<sup>1,3</sup>

The discovery of effective interventions to prevent and delay frailty and resultant disability in older persons is a public health priority.<sup>2</sup> Inactivity is problematic for older individuals and particularly prevalent among those with co-morbidities. Higher

activity levels are associated with fewer declines in physical function and quality of life. As people age, they often suffer progressive deficits in health and function following a continuum that leads to frailty, disability, and death.<sup>4,7</sup> Current literature considers frailty as a pathway from morbidity to disability<sup>4,7</sup> that is not a direct result of chronic disease. Instead, it is associated with inactivity, the loss of physical reserves, and the decline of homeostatic capacities.<sup>11,12</sup> The Punished Inefficiency Model of frailty views frailty as a dynamic process – a perpetuating, synergistic interaction – whereby individuals with loss of reserves also experience loss of efficiency in a manner that is detrimental to maintaining adequate activity.<sup>5</sup> Stress strengthens this negative feedback on activity, leading to disuse and worsening of chronic disease states.<sup>5</sup> Programs that improve exercise acceptance and adherence can potentially halt the cycle that leads to inactivity, frailty progression, and functional dependence.

Evidence suggests that exercise interventions may potentially prevent, delay, or reverse the frailty process and therefore restore and/or maintain functional independence in older adults.<sup>2,4,11,12</sup> The American College of Sports Medicine and American Heart Association recommends that sedentary older adults begin with balance, flexibility, and strength training to build endurance prior to participating in aerobic exercise.<sup>13</sup> Tai Chi, a gentle and smooth neuromotor exercise, has drawn increasing attention within the rehabilitation community as a means to improve function and

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reduce falls and disability.<sup>14</sup> Moreover, Tai Chi's fall-risk reduction effect has been verified and recognized as one of the most beneficial forms of fall prevention exercise recommended in Clinical Practice Guidelines.<sup>15–17</sup> Evidence indicates that long- and short-term Tai Chi practice in the older population has additional benefits including: reduced fear of falling; decreased musculoskeletal pain; improved sleep; lowered stress levels; improved emotional health, psychosocial status and immune function; increased self-efficacy; and improved executive and cognitive function.<sup>18–20</sup> Tai Chi has also been shown to positively influence functional limitations among frail older adults, however the effect is modified by type of Tai Chi protocol used, variable outcome measurements, and inconsistent subject participation and protocol adherence.

Recent studies of the effectiveness of Tai Chi report inconclusive results in frail elderly and adults with a high fall risk.<sup>21–23</sup> A 24-week modified Sun Tai Chi intervention was not superior to a control seated flexibility and stretching activity in at-risk community dwelling older persons.<sup>23</sup> However, the average number of Tai Chi and control exercise sessions subjects attended was approximately half the number scheduled. Additionally, withdrawal rates were high: 32% of the Tai Chi group versus 25% of controls.<sup>23</sup> Post-hoc analysis of another trial suggested that the high participant withdrawal and low adherence rates accounted for the lack of positive effects on falling and physical performance in the participants.<sup>24</sup> Poor exercise motivation and engagement remain as significant methodological barriers in trials of Tai Chi effectiveness in the frail elderly.

Proto Tai Chi (aka Wu Qin Xi) is the ancient Chinese exercise from which Tai Chi evolved.<sup>25–28</sup> It is one of the National Fitness Programs recommended by the Chinese Health Qigong Association, Center of General Administration of Sport.<sup>29</sup> Hua Tuo, a Chinese physician in the Han Dynasty (25–220 AD), developed the exercise through studying natural movements and fun postures of five animals<sup>25,26</sup>: tiger, deer, monkey, bear, and crane. The movements of each animal are distinctive and provide the basis for the exercise that is performed through imitative posturing and stance. When practicing an animal movement, one is encouraged through mental imagery to “be the animal,” and to be expressive with movement to make it more enjoyable (for instance, visualization of one's self as a witty deer or playful monkey<sup>28,29</sup>). These intuitive movements are simple to imitate and perceived to be more enjoyable to practice due to human's ingrained familiarity and societal bonding with animals.<sup>26,30</sup> These features make Proto Tai Chi a pleasurable and promising activity option for older adults. Although this exercise was introduced to the United States in the 1990s,<sup>27</sup> the literature is devoid of published studies of its utility and effectiveness in older American participants.

Our long-term goal is to investigate the effectiveness of Proto Tai Chi exercise for maintaining or enhancing physical and cognitive performance in frail older Americans, including those with cognitive impairment and dementia. The primary objectives of this pilot project were to assess acceptability and safety of our exercise protocol, and evaluate participants' feedback and preferences regarding the Proto Tai Chi exercise program. We hypothesized that participants in a Proto Tai Chi program would rate the activity as enjoyable and maintain high levels of participation over five consecutive days of scheduled exercise. Based upon previous studies of a week-long Tai Chi workshop that improved balance performance of the participants and specifically, in adults with Parkinson's disease,<sup>31,32</sup> the secondary objective was to assess preliminary efficacy of the program using simple parameters of physical function. Our hypothesis was that program participants would demonstrate improvements in measures of gait and range of motion.

## Methods

### Design

A pre-test and post-test within-subjects design was used.

### Sample & recruitment

Eligible participants in the pilot study were English speaking, community-dwelling adults age 65 years and older, diagnosed with at least one chronic health condition. They were also required to have transportation to attend the exercise classes that were held in a community center in mid-Michigan.

Fliers and exercise class announcements were distributed through local geriatrics clinics, community centers and by word-of-mouth to invite potential participants. Two trained research assistants made initial telephone contact with those who responded to the project announcement, screened potential participants to determine their interest and eligibility for the study, and scheduled the informed consent and baseline assessment visits. Individuals with suspected cognitive impairment as assessed by the Six Item Screener<sup>33</sup> were deemed ineligible and excluded. The Six-Item Screener is an efficient and accurate screening tool for studies that rely on subjects' cognitive ability to participate in a complex intervention and/or provide self-reports.<sup>33</sup> Individuals with contraindications to standing physical exercise (e.g., severe lumbar spine, or hip arthritis) were also excluded. A ten dollar gift card was provided to those who underwent pre- and post-evaluation as a token of appreciation for their time devoted to the project data collection. The study was approved by the Michigan State University Institutional Review Board.

### Movement description

The core program consisted of five animal exercise forms, developed on the basis of the animal exercise movements illustrated by the Traditional Chinese Culture Institute International LLC<sup>28</sup> and those compiled by the Chinese Health Qigong Association.<sup>26</sup> The five animal exercises imitate the powerfulness of the tiger, the serenity and ease of the deer, the composure of the bear, the agility of the monkey, and the litheness of the crane.<sup>26,28</sup> These techniques incorporate the essential features of the traditional Chinese Tai Chi that emphasize body alignment, stance balance, and the coordination of arms, legs, eyes, breathing and mind. As described by the Chinese Health Qigong Association, the tiger, deer, bear, monkey, and crane movements express their respective characteristics. For example,

*“the moving course of arms and corresponding changes of fingers in Deer Wrestling, as well as the forward stride of legs, the fist-clenching and wrist-locking hand moves, the back-and-forth movement of the gravity center, the bouncing foot changes, and the flexible and smooth motions in Deer Running all reflect the characteristics of the Deer Exercise. Its characteristics are also reflected in its artistic conception, verve, and changes of breath” (A simple Analysis of the Meaning of Health Qigong-Wu Qin Xi, May 22, 2009).<sup>30</sup>*

The intensity of each animal posture and stance was modified in the protocol to simplify participants' understanding of exercise instructions as follows: The Tiger Climbs the Mountain; The Deer Nods Its Head; The Monkey Gazes at the Horizon; The Bear Rotates Its Shoulders; and The Crane Spreads Its Wings. The exercise routine emphasized the practice of single forms with multiple repetitions.

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