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An Evaluation of the Potential Effectiveness of a Tai Chi Program for Health Promotion Among People with Severe Mental Illness

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An Evaluation of the Potential Effectiveness of a Tai Chi Program for Health Promotion Among People with Severe Mental Illness

Abstract
In response to the significant health disparities among persons with severe mental illness (SMI), this pilot study was developed to evaluate the potential effectiveness of a Tai Chi program provided to adults who are members of a psychosocial clubhouse program. A non-randomized, controlled pretest-posttest design was used, and qualitative data from a program evaluation survey is shared to provide insight into the strengths and limitations of this explorative study. A simplified, beginner-level Tai Chi program was provided twice a week for 12 weeks. Changes in cardiac and pulmonary function and perceived quality of health were measured. Results support the potential for Tai Chi to promote health among this population. Challenges to conducting this type of research are discussed, as well as implications for future, larger studies of health promotion interventions.

Comments
Guest edited by Ben Atchison, Ph.D., OTR/L, FAOTA

Keywords
mental illness, health promotion, Tai Chi, psychosocial clubhouse

Cover Page Footnote
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Recent studies have shown that people with severe mental illness (SMI) have higher mortality rates and lower life expectancy than the general population (De Hert, Dekker, Wood, & Kahl, 2009). In fact, adults with SMI die, on average, 25 years earlier than non-mentally-ill adults in the U.S. (Colton & Manderscheid, 2006). Moreover, people with SMI are five times more likely to have at least one co-occurring medical condition than the general population, with cardiac and pulmonary disease among the leading causes of death (Colton & Manderscheid, 2006). Risk factors contributing to this disparity in health include the prevalence of a sedentary lifestyle, obesity, smoking, substance use, lack of emotional support systems, less access to quality health care, and psychotropic medication side effects that include weight gain and lethargy. Lower socioeconomic status of the majority of the persons with SMI and the subsequent limited ability to utilize preventative medicine are additional factors that can lessen quality of life and life expectancy for this population (Barreira, 1999; Bartels & Desilets, 2012).

Despite evidence to support the need to provide health and wellness programs to those with SMI, few outpatient mental health programs consistently incorporate such treatment. Instead, typical outpatient mental health services, according to the Substance Abuse and Mental Health Services Administration (SAMHSA, 2003), focus primarily on verbal psychotherapy and medication monitoring.

In a report by the National Association of State Mental Health Program Directors (NASMHPD) Medical Directors Council (2008), cultural and societal reasons for this lack of focus on physical health by mental health care providers include psychiatrists' fears that clients will not take psychotropic medications if educated about possible side effects, such as weight gain and lethargy, the limited time available to confer with clients about their medical status, and clinicians' limited knowledge and training in health promotion interventions.

A recent, promising development is the creation of the SAMHSA-HRSA Center for Integrated Health Solutions (CIHS), jointly funded by the SAMHSA and the Health Resources and Services Administration (HRSA). Started in 2011, CIHS provides education, training, and technical assistance to community health organizations to integrate primary and behavioral health services to address the health disparities among people with SMI (SAMHSA, 2012).

Many studies have been conducted over the past 20 years to substantiate the physical and mental health benefits of exercise among the general population (Saxena, van Ommeren, Tang, & Armstrong, 2005; Warburton, Nicol, & Bredin, 2006). Fewer studies have been conducted on the SMI population, and the results are inconsistent. A meta-analytic review investigating the effects of exercise on depression (Conn, 2010) suggested that individuals who exercised experienced a decrease in depressive symptoms. A study by Gorczynski & Faulkner (2010) suggested that individuals with schizophrenia who participated in an exercise program experienced increased physical and mental well-being. Overall, however, even in studies that reported successful outcomes, only a minority of

participants achieved significant changes in health (Bartels & Desilets, 2012). Furthermore, only a few exercise studies have evaluated cardiovascular status, although cardiovascular functioning is an important indicator of health (Bartels & Desilets, 2012).

The exercise programs cited in these studies utilized activities such as cycling, jogging, swimming, brisk walking, use of weight equipment, and use of fitness center facilities. Tai Chi, the selected form of exercise in this study, is a non-traditional form of exercise that is growing in popularity in both the general and clinical setting. It is a weight bearing and mild intensity cardiovascular exercise, utilizing deep breathing, relaxation, and slow, gentle movements (Taylor-Piliae & Froelicher, 2004). In a review of nine randomized controlled trials, twenty-three non-randomized controlled studies, and fifteen observational studies, Wang, Collet, and Lau (2004) concluded that Tai Chi appears to have physiological and psychosocial benefits and appears safe and effective in improving balance, flexibility, and cardiovascular fitness in older adults with chronic physical conditions.

The purpose of this study was two-fold:

1. To determine whether an ongoing exercise program of Tai Chi provided to adults with SMI will positively affect both actual and perceived physical health.
2. To evaluate the feasibility of implementing research of this type in a community mental health setting.

The specific hypotheses of this study were:

1. Participants who engage in 45 min of Tai Chi twice weekly for 12 weeks will show improved blood pressure and pulmonary function.
2. Participants who engage in 45 min of Tai Chi twice weekly for 12 weeks will show improved quality of health as measured by the RAND SF-36-Item Health Survey 1.0 (RAND SF-36).

Methods

Participants

Clubhouse members are adults receiving outpatient mental health services for SMI, such as schizophrenia, major depressive disorder, and bipolar disorder. Participants were active members of a clubhouse program, meeting the general requirements of membership, which included voluntary participation and the ability to give informed consent without a guardian.

Setting

The psychosocial clubhouse program is based on the Clubhouse Model of Psychosocial Rehabilitation. This model provides a strengths-based approach to rehabilitation, in which members are empowered to engage actively in developing, facilitating, and evaluating programming for all members. The clubhouse model differs significantly from traditional day treatment programs in that it is not clinically focused, but is based on a partnership model in which members and staff work collaboratively without a hierarchical, medical-model structure. The clubhouse program operates numerous work units, such as clerical, food service, employment, and social recreation. Collectively, these ongoing work

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units comprise what is referred to as the "work-ordered day."

Recruitment Process

This study was approved by Western Michigan University's Human Subject Institutional Review Board (HSIRB). The Tai Chi classes were open to any member, whether or not they were enrolled in the research study. The principle investigator (PI) invited members to participate in the study during two informational meetings held at the clubhouse site. The time, location, and purpose of the informational meetings was announced to the members at several community meetings, which were co-led by members and staff. A flier advertised the Tai Chi class and study, to ensure that those who did not attend the community meetings would be notified. The informational meetings notified members that a 12-week Tai Chi class, as well as a pretest and posttest health screening, would be provided. Enrollment was open to all who completed the health screening.

Instruments

The study used three instruments to assess pretest and posttest function. The first was a measurement of perceived health. The researchers evaluated participants using the RAND SF-36, a widely used survey instrument with well substantiated psychometric properties (LaPier, 2005). Internal reliability was found to be high, with an alpha coefficient of Cronbach ranging from higher than .85 (Brazier et al., 1992) to 0.91 (Bousquet et al., 1994). Construct, convergent, and discriminant validity has also been supported in numerous studies (McHorney, Ware, & Raczek, 1993; Scott, Tobias, Sarfati, & Haslett, 1999; Jenkinson, Coulter, & Wright, 1993; Brazier, et al., 1992). The RAND SF-36 is an exact content replica of the SF-36 instrument, which is commercially available but differs slightly in recommending alternate scoring algorithms for two items. The RAND SF-36 consists of 36 items assessing eight domains of health: physical functioning, energy/fatigue, bodily pain, role limitations due to physical health problems, role limitations due to personal or emotional problems, general mental health, social functioning, and general health perceptions. The RAND SF-36 is comprised of various health-related statements and questions describing current as well as previous functioning, using three-, five-, and six-point Likert scales to report responses. Examples include: "I seem to get sicker a little easier than other people"; "I expect my health to get worse"; "How much bodily pain have you had in the past four weeks?"; and "How much time during the past four weeks have you felt calm and peaceful?" Participants were given the option to complete the survey alone in a room adjacent to the spirometer and blood pressure health screening or to receive assistance by the PI in reading and recording the responses. For those who chose to complete the survey independently, the PI remained in the general vicinity to answer any questions or clarify any of the items as needed. Scores from each domain were compiled into summary scores for physical and mental health. This survey took approximately 15 min to complete.

The second instrument was a measurement of pulmonary function. Measurement of lung volumes and forced expiratory flow rates are useful

clinically in identifying the presence of obstructive or restrictive lung disease (Al-Ashkar, Mehra, & Mazzone, 2003). A computerized spirometry tool was used to evaluate pulmonary function. Spirometry is defined as the measurement of the air moving in and out of the lungs during various respiratory maneuvers (Crapo, 1994). More specifically, the individual is instructed to take a deep breath and then exhale forcefully for as long as possible. The total volume of air that is exhaled is the forced vital capacity (FVC). The air that is exhaled during the first second of forced expiration is the forced expiratory volume (FEV1). Both FEV1 and FVC measurements were recorded and the ratio of these two measurements (FEV1/FVC) was completed. A trained and experienced physician assistant (PA) conducted the spirometry. The PA conducted three trials, approximately five min apart, in order to obtain an average measurement. The spirometry procedure took approximately 15-20 min to complete.

The third measurement assessed cardiac function using a manual sphygmomanometer, also known as a blood pressure cuff. As in the spirometry procedure, the PA conducted three trials, approximately five min apart, in order to obtain an average measurement of resting blood pressure. This procedure also took approximately 15-20 min to complete.

In addition to these three measures of function, the participants received a brief survey of program satisfaction, developed by the researchers, at the time of the post-program health screening process. This survey prompted respondents to indicate what they found helpful or not helpful about the following five aspects of the program: the informational meetings/orientation, the health screenings, the health satisfaction questionnaire, the effectiveness of the Tai Chi instructor, and the times/number of classes. The survey also prompted participants to include any additional comments or suggestions.

Intervention Procedures

The Tai Chi group intervention was held in a designated room at the psychosocial clubhouse facility. This multi-purpose room was modified with privacy screens, soft lighting, and a portable water fountain to promote a wellness atmosphere. Because individuals with SMI often have difficulties with cognition and motor learning, the certified instructor taught a simplified form of Tai Chi: the Tai Chi for Arthritis program (Lam, 1997). Groups were held twice weekly. Each session was 45 min in length, including a warm-up and cool-down period. Attendance was taken at each session.

Data Analysis

Researchers entered data into SPSS for Windows, Version 16.0. Demographics were calculated for each group. The small sample size and the resulting lack of power made inferential statistical analyses inappropriate. Visual analyses were completed for the RAND SF-36. Blood pressure was analyzed in terms of normal ranges and changes from pretest to posttest. Lung capacity was analyzed using percentage of change from pretest to posttest.

Results

Demographics

The treatment group included participants who attended nine or more sessions and the control

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group included participants who attended two or fewer sessions. The treatment group and the control group each contained three participants. Each group included two females and one male participant. The mean age of the treatment group was 38 years (sd = 21.70) with a range of 24-63 years. The mean age of the control group was 56.3 years (sd = 11.85) with a range of 49-70 years. Each group included two Caucasians and one African-American. All participants had an Axis I diagnosis of mental illness, as classified in the Diagnostic and statistical manual of mental disorders (American Psychiatric Association, 2000).

RAND SF-36-Item Health Survey 1.0

Three aspects of perceived health were measured from the RAND SF-36, including Physical Functioning, Energy Level, and Social Functioning. The results for Physical Functioning indicated that two participants from the treatment group improved in perceived physical health while one remained the same (see Figure 1). Participant 1 increased from 45 to 50, Participant 2 increased from 60 to 80, and Participant 3 remained unchanged at 85. The results for Physical Functioning for the control group indicated that two participants improved in perceived physical health and one decreased (see Figure 2). Participant 4 increased from 70 to 80, Participant 5 increased from 75 to 80, and Participant 6 decreased from 35 to 25.

Changes were also noted in the Energy Level variable. Two of the participants in the treatment group improved while one remained the same (see Figure 3). Participant 1 increased from 55 to 75, Participant 2 remained unchanged at 60, and Participant 3 increased from 55 to 60. Two of the participants in the control group demonstrated decreased energy level and one remained the same (see Figure 4). Participant 4 decreased from 60 to 50, Participant 5 decreased from 45 to 35, and Participant 6 remained at 20 for pretest and posttest scores.

The RAND SF-36 scores for perceived Social Functioning also changed from pretest to posttest. Two participants in the treatment group reported increased social functioning while one reported decreased social functioning (see Figure 5). Participant 1 increased from 75 to 88, Participant 2 increased from 50 to 75, and Participant 3 decreased from 100 to 63. All three participants in the control group reported decreases in social functioning from pretest to posttest (see Figure 6). Participant 4 decreased from 75 to 63, Participant 5 decreased from 75 to 50, and Participant 6 decreased from 62.5 to 38.

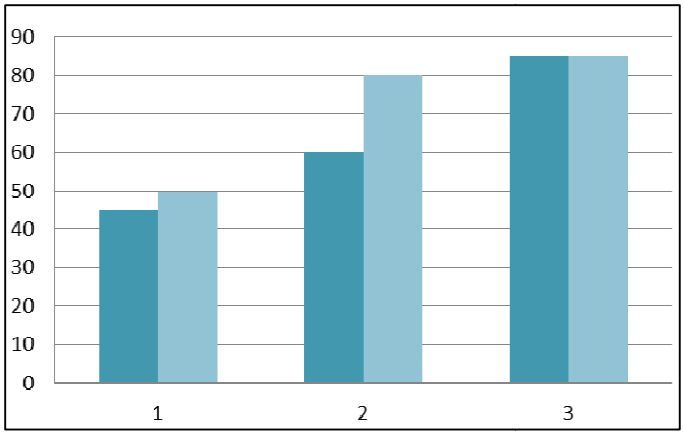

Figure 1. Physical Functioning – Treatment Group.

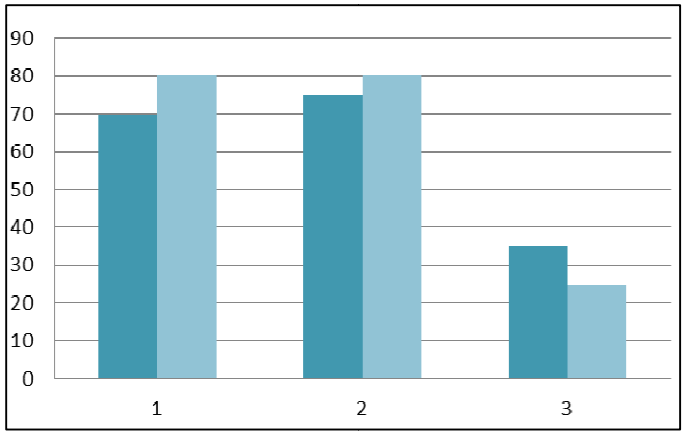

Figure 2. Physical Functioning – Control Group.

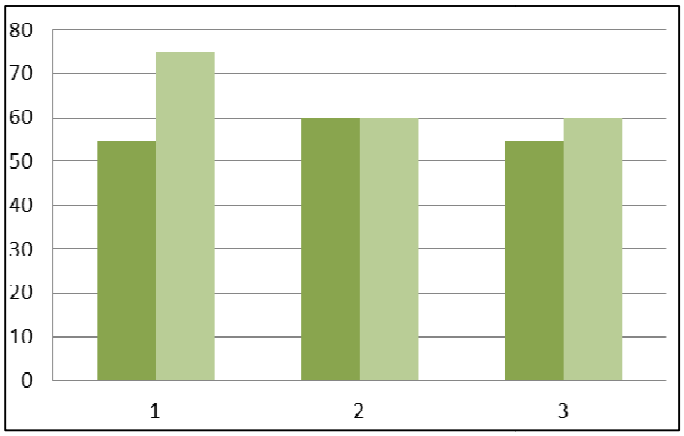

Figure 3. Energy Level – Treatment Group.

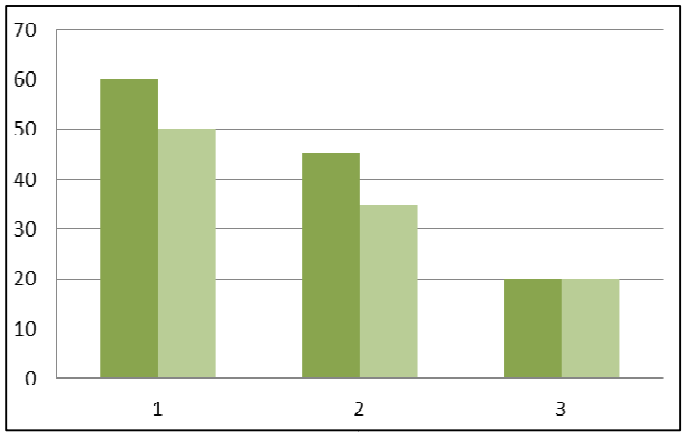

Figure 4. Energy Level – Control Group.

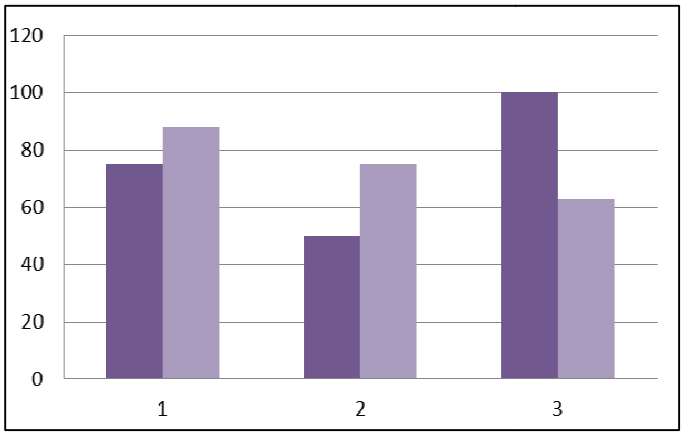

Figure 5. Social Functioning – Treatment Group.

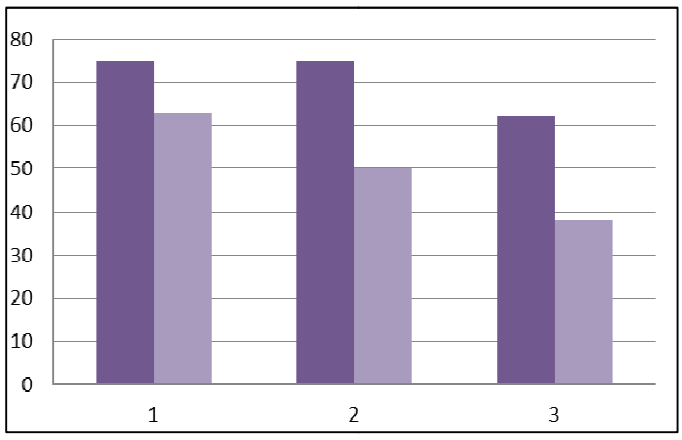

Figure 6. Social Functioning – Control Group.

Blood Pressure

In each group, the blood pressure for two participants was normal at pretest and remained within the normal range at posttest. In the treatment group, one person had a blood pressure of 131/68 at pretest and that decreased to 101/66 at posttest. In the control group, one person demonstrated an increase in blood pressure from 118/77 at pretest to 140/97 at posttest.

Spirometry

Changes were also noted in lung capacity from pretest to posttest as noted on the spirometry measures. In the treatment group, two participants demonstrated increased lung capacity and one demonstrated slightly decreased lung capacity. Participant 1 demonstrated an 11% increase, Participant 2 demonstrated a 5% increase, and Participant 3 demonstrated a 2% decrease in FEV1/FVC.

In the control group, two participants demonstrated a high percentage decrease in lung capacity and one demonstrated a slight increase in lung capacity. Participant 4 demonstrated a 28% decrease, Participant 5 demonstrated an 8% increase, and Participant 6 demonstrated a 53% decrease in FEV1/FVC. Participant 6 was the participant who also demonstrated increased blood pressure.

Six participants completed the program evaluation survey. The qualitative findings were as follows:

1. Informational meetings/orientation process: 4/6 participants answered this item. All responses were positive, e.g., "was very helpful and got me to be involved," "just asked to sign up was free that was good."
2. Health screening: 5/6 participants answered this item. All responses were positive, e.g., "very easy and professional," "really helpful."
3. The health satisfaction questionnaire: 5/6 participants answered this item. Responses were mixed, e.g., "it was good for the program we were involved in," "pains stayed mostly the same," "good," "not too long to do."
4. The effectiveness of the Tai Chi instructor: 5/6 respondents answered this item. All responses were positive, e.g., "he was very helpful and knowledgeable and helped me with my home workout," "he was great," "he did a really good job."
5. The times/number of classes: 5/6 participants answered this item. All provided suggestions for changes, e.g., "class times were scattered but a regular time would have been better," "cannot do on Wed," "three classes."

Discussion

The most marked difference between the experimental and the control group participants was noted in the RAND SF-36 item: Energy Level. While two of the three experimental group participants experienced a feeling of increased energy level, and the third remained the same at the end, all three control group participants experienced a feeling of decreased energy level by the end of the study.

Similar findings were noted in the Social Functioning category of the SF-36. Two of the three experimental group participants experienced an increase, with the third participant reporting a decrease. All three of the control group participants, however, reported a decrease in social functioning. When compared to the control group, these differences trend toward supporting the hypothesis that the Tai Chi intervention had a positive impact on participants' perceptions of their physical functioning, energy level, and social functioning.

The most marked difference in blood pressure was noted in two participants: one from the experimental group and one from the control group. The experimental group participant had a large improvement in systolic pressure, with a total blood pressure in a desirable range. The third control group participant, however, experienced a change from within an acceptable range to a reading in the hypertensive category.

Changes in lung capacity were more difficult to substantiate, based on observations of difficulties of one of the participants in completing the spirometry procedure. This appeared to be due to cognitive difficulties in following the directions for inhaling and exhaling upon verbal command. This participant was the treatment group member who demonstrated a -1 decrease in lung capacity. Use of an alternative measure of pulmonary function will be considered for a future study. The pulse oximeter shows promise as a brief, non-invasive measure, using a fingertip sensor to measure the oxygen saturation of arterial blood (Valdez-Lowe, Ghareeb, & Artinian, 2009). One of the aims of this study was to assess the feasibility of conducting this type of research in a community setting with people with SMI. Review of the qualitative data from the program evaluation survey reflected overall satisfaction among the respondents, with an exception for the scheduling of the classes. This is consistent with what we anticipated to be our greatest challenge maintaining regular attendance by the participants. The program schedule was a significant obstacle, as we needed to avoid any conflict with the work-ordered day of the clubhouse model. While we would have preferred a more regular, frequent schedule, e.g., Mondays, Wednesdays, and Fridays from 10-11:00 a.m., we had to utilize two days of the week, one a morning timeslot, the other an afternoon timeslot.

The treatment group participants were enthusiastic, usually arriving early to set up the room, and seemed to enjoy the camaraderie of the core group of participants, but struggled at times with other commitments, both clubhouse-related and personal. On days of poor weather, participants sometimes chose to stay home. Our experiences were similar to those reported in a 2007 survey by McKay & Pelletier, in which clubhouse directors self-reported the number of health promotion activities as well as barriers to such programming. Results revealed that physical exercise was the primary health promotion activity provided, but that cost, member motivation, existing health problems, lack of social support, lack of transportation, and social stigma were barriers to participation.

Finally, while this pilot study shows promise for the use of Tai Chi as a health-promoting activity, we would design a future study using a

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more comprehensive program including health education, such as nutritional counseling and the use of incentives to promote participant motivation. In fact, a recent systematic review of health interventions for persons with SMI found that a multi-prong approach, offered at least three times weekly, coupled with cognitive behavioral strategies and incentives, was most successful (Bartels & Desilets, 2012). Preliminary data from a 12-month study by Brown & Bledsoe (2012), which focuses on weight loss by incorporating both nutrition education and exercise, is also encouraging. We believe this more comprehensive approach could be more successful in retaining participants and could lead to greater outcomes. A participatory research design, in which participants are empowered to learn to lead their own exercise programs and conduct their own health screenings, could also be a useful approach to improving sustained participation and outcomes.

Limitations

Results of this pilot study point to several limitations. We had not anticipated that any of the participants would be unable to meet the cognitive requirements of inhaling and exhaling on command for the spirometry measure. The inability of one participant to follow directions during the respiratory maneuvers resulted in unreliable spirometer readings for that participant. In addition, the limited number of participants and the irregularity of attendance at the Tai Chi sessions were also challenges that were both anticipated and experienced. Due to the low number of participants, we were unable to draw conclusions of clinical significance from changes in health screening scores. Instead, we were limited to describing general trends of improvement or decline based on changes in scores.

Implications for Practice

The health and wellness needs of people with SMI must be addressed in order to facilitate improved quality of life, reduce health disparities, and decrease societal costs. Occupational therapists (OTs) can play an important role in developing and advocating for needed health promotion interventions for people with SMI. In fact, in the Occupational Therapy Practice Framework (AOTA, 2008) health management and maintenance is an area of occupation within the scope of practice, with the role of the OTs defined as: "Developing, managing, and maintaining routines for health and wellness promotion, such as physical fitness, nutrition, decreasing health risk behaviors, and medication routines." (p. 631).

Clearly, there are challenges to developing and maintaining health promotion activities for people who have SMI when the intervention involves an ongoing time commitment and participation in exercise, which may not be a highly valued or familiar activity. Effecting change at the organizational level is paramount in order to increase opportunities for health promotion interventions as an integral and routine part of the treatment and ongoing recovery process.

Conclusions

The purpose of this pilot study was two-fold: To determine whether an ongoing exercise program of Tai Chi provided to adults with SMI would positively affect both actual and perceived physical health, and to evaluate the feasibility of

implementing research of this type in a community mental health setting. While there were several challenges, which were lessons learned for future studies, the data supports the value of an ongoing program of Tai Chi in promoting both actual and perceived physical and mental health. Future, multi-site studies that incorporate a more comprehensive approach to exercise and health education are needed to address the significant health disparities among people with SMI.

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