



Published in final edited form as:

BMJ Support Palliat Care. 2020 December ; 10(4): e44. doi:10.1136/bmjspcare-2018-001685.

Tai Chi for heart attack survivors qualitative insights

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Abstract

Objectives—Cardiac rehabilitation (CR) programmes are standard of care for patients following a coronary event. While such exercise-based secondary prevention programme do offer benefits, they are used by less than 30% of eligible patients and attrition within these programmes is high. This project is a nested qualitative assessment of a pilot programme considering Tai Chi (TC) as an alternative to CR. We hypothesised that TC may overcome several key barriers to CR.

Methods—A semistructured focus group agenda was used to assess three key domains of feasibility: (1) patients' experiences, (2) reasons/barriers for not having attended CR and (3) any improvements in physical activity and other secondary outcomes (quality of life, weight, sleep). A thematic analysis was used to better understand the key concepts.

Results—This high-risk group of patients reported that they enjoyed TC exercise, and felt confident and safe doing it. TC practice was reported to support other types of physical activity allowing for a generalisation of positive effects.

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Contributors

LC contributed to manuscript, parent project planning, planned and executed qualitative substudy. JK contributed to manuscript and program administration. JT contributed to manuscript and assisted with analysis of qualitative substudy. GY and PW contributed to manuscript and parent project planning. ES-B conceived of the study, obtained funding, and contributed to the parent project planning and manuscript.

Competing interests None declared.

Patient consent for publication Parental/guardian consent obtained.

Ethics approval The Institutional Review Board at the Miriam Hospital approved this study. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Provenance and peer review Not commissioned; externally peer reviewed.

Discussion—This analysis is consistent with published reports of TC practice improving mood and psychological well-being. Qualitative methods allowed us to find emergent experiential reports of behaviour change factors found in established behaviour change theories.

INTRODUCTION

Cardiac rehabilitation (CR) programmes are standard of care for patients following a coronary event or coronary revascularisation. While such exercise-based secondary prevention programmes do offer benefits,¹ such as reducing overall and cardiovascular mortality²³ and markers of disease progression or reoccurrence,⁴⁵ they are used by less than 30% of eligible patients⁶ and attrition within these programmes is high, approaching 60%.⁷ In response to this underutilisation, the American Heart Association has requested the development of novel programmes that target individuals who opt out of CR.⁶ Enrolment is especially low among older individuals, women and minorities.⁸ System-level and logistical barriers to CR are poor referral rates, distance from the rehabilitation centre and high co-pays. Patient-level factors include low baseline exercise capacity, work conflicts, depression and low social support.⁸⁹

Attrition during CR is also high, reaching up to 65%.¹⁰ Patients drop out of CR because of the limited number of exercise options available and because opportunities for social interactions are very limited during CR, as patients typically exercise alone.⁹¹⁰ Interestingly, dislike of exercise, or perception of exercise as dangerous, painful or tiring are the most important barriers to enrolment and retention in CR among older patients and women.^{11–13} In our pilot study, dislike of CR exercise (62%) and perception of CR exercise as dangerous (59%) were the most important reasons for not enrolling in CR.

Tai Chi (TC) may be an appropriate alternative for patients who opt out of traditional CR. This mind–body intervention, which includes low–moderate intensity aerobic exercise, self-awareness and meditative breathing, has been shown to improve aerobic capacity in older sedentary adults¹⁴ and to improve exercise self-efficacy, quality of life and mood in patients with heart failure.¹⁰ In conjunction with traditional CR, TC may improve exercise tolerance and quality of life compared with CR alone.^{15–17} TC may also overcome key barriers to CR, such as age-related fear or dislike of exercise.¹⁸¹⁹ TC has been shown to be safe in older and de-conditioned adults.²⁰ Moreover, its relatively low physical intensity and emphasis on gradual progress is typically perceived as non-threatening, leading to relatively high rates of adherence and acceptance in prior studies.¹⁰ Longer-term adherence is also furthered by the fact that TC can be practised at home between and after formal class training without the need of special equipment. Finally, TC practice is also associated with improvements in mood²¹ and social support.⁸ These important determinants of the overall prognosis of patients surviving acute cardiac events are often inadequately addressed in traditional CR programmes.

While we are not aware of studies that show that TC is equivalent or superior to the standard-of-care CR, given the potential benefits that TC may offer to the high-risk group of individuals that opt out of traditional CR programmes, we conducted a pilot study designed to establish the feasibility, optimal dose and acceptability of a TC programme for this

population. Given the multidimensional, holistic nature of our intervention, we included a qualitative substudy, which is particularly suitable for capturing complex, unique experiences²² beyond what can be gained through quantitative instruments.²³ The purpose of the qualitative analysis was to gain a deeper understanding of patients' perspectives on their participation in the TC programme to guide further programme development. Specifically, our main goal was to understand the feasibility of the programme. Thus, we collected subjects' (1) reports of what encouraged practice, termed *perceived benefits of practice*; and (2) reports of what makes exercise or CR difficult or unattractive, termed *perceived barriers to practice*. Second, we collected subjects' understandings 'why' they thought TC was benefiting them, to inform choices instruments to quantify potential psychosocial mediators of the effects of TC that might be evaluated in a future larger trial in this population.

METHODS

Parent study

The Gentle Cardiac Rehabilitation Study (NCT02165254) was a phase II randomised clinical trial of TC exercise for patients with cardiovascular disease who had indication to attend traditional CR yet were unable or unwilling to join.²⁴ Methods are described in full elsewhere.²⁵ In brief, the purpose of the study was to determine the feasibility and acceptability (primary outcomes), and to evaluate two different doses of TC exercise on aerobic capacity, physical activity, weight, sleep quality and quality of life. Inclusion criteria included history of acute coronary syndrome, stable angina or revascularisation procedure; able to understand and speak English; willing to commit to the demands of the study; at least 21 years old; and physically inactive. Participants were excluded if they were unable or unwilling to provide informed consent, were planning to move out of the area during the study period, enrolled in a CR programme or currently practising TC or other mind–body training. Other exclusion criteria included unstable angina, baseline blood pressure >200/110 mm Hg or symptomatic orthostatic hypotension, uncontrolled arrhythmias, a recent thrombophlebitis, pericarditis or myocarditis, an abnormal stress test, New York Heart Association functional class IV heart failure, cognitive impairment, orthopaedic problems prohibiting TC practice, severe depression, substance use and terminal illness with a life expectancy <1 year.

Participants were randomly assigned to a 'LITE' (one TC session twice weekly for 12 weeks) or to a 'PLUS' condition (one TC session 3 times weekly for 12 weeks, followed by maintenance classes 1–2 times weekly for an additional 12 weeks). Both groups were encouraged to practice at home at least three times a week using a study DVD. Because primary TC training was delivered in a class format, we enrolled three cohorts of participants.

Qualitative substudy

Each cohort of participants was invited to participate in a semistructured focus group at the completion of the intervention (24 weeks). All sessions were conducted at the Center for Cardiac Fitness at the Miriam Hospital between August 2015 and August 2016 by an experienced qualitative researcher (LC) with input from co-facilitators ES-B and JK. Focus

groups were audio-recorded (with subject permission/ informed consent) and lasted about 1 hour. Participants' demographic data were collected at baseline via self-administered questionnaires. Participants received compensation for their participation in the focus group (US\$40 gift card). The Institutional Review Board at The Miriam Hospital approved this study.

Focus group agenda

Each group started with a brief introduction of the team guiding the focus group, an explanation of the purpose of the focus group and instructions/assurances regarding confidentiality. A semistructured agenda was developed to assess three key domains related to feasibility: (1) patients' experience in the study (what participants liked and disliked about TC; preference for frequency or duration of classes; reasons for attending or missing classes; instructors; barriers to TC practice at home) (24 weeks vs 12 weeks); recruitment (advertising that may increase the appeal of the study; use of 'Gentle Rehab' vs other names for the study intervention); (2) reasons/barriers for not having attended CR; views and opinions about CR programmes; participants' beliefs as to whether TC overcame barriers to CR attendance; suggestions for programme improvements; and (3) whether TC improved physical activity and other secondary outcomes (quality of life, weight, sleep). In designing the agenda, we used both positive and negative prompts to collect a balanced report of patients experiences (please see online appendix A).

Data analysis

Using methods employed widely, recordings were transcribed and checked for accuracy. Audio transcripts were read at least twice by two authors (LC and JT) and then double coded for themes independently. Coding consisted of extracting sought and emergent themes as well as condensing responses to each topic across the sample. Any disagreement in coding was addressed in discussion between the coders. We assessed the data for saturation on key content areas and when finding repetition of themes, chose to complete this stage of data collection. Next, we employed a thematic analysis to better understand the key concepts.

Due to the nature of the semistructured agenda, measuring frequencies of the qualitative reporting of particular themes made little sense. Instead, terms such as 'all', 'most', 'a few' and 'one' were used following the recommendations of Price *et al.*²⁶ Further, given the small sample size, we pooled the two dose groups for qualitative analysis in order to strengthen our ability to find common themes across dosages. Results are presented in the following categories: (1) barriers to physical activity and traditional CR; (2) perceived benefits of the TC programme; (3) barriers to TC programme and feedback on programme improvement; (4) subjects' felt markers of personal training success.

RESULTS

Thirty-three subjects were enrolled in the parent study. Four were not able to begin the intervention due to health and other issues. Of the 29 starting the TC intervention, two had to discontinue the intervention due to health problems and three were lost to follow-up. Among the 24 participants who completed the TC intervention and were invited to join the focus

groups, 21 (87.5%) agreed to participate (16 M, 5 F; age range, 44–82 years). Participants self-identified as non-Hispanic white (n = 20) and American Indian/ Alaskan Native (n=1). About 50% of focus group participants were married or in a committed relationship; 28.6% had a high school education, 38.1% had attended some college, and 33.3% had a college or postgraduate degree. The focus group subsample was similar to the overall sample in terms of education, race ethnicity and social network.

Perceived barriers to physical activity and traditional CR

Among reasons for not attending CR, many subjects mentioned fear of exercise and movement, and an overall fragility and mistrust of their bodies following their cardiac event. Online supplementary table 1 presents representative quotes from TC participants speaking of perceived barriers to physical activity and traditional CR.

Perceived benefits of practice

Comparisons between TC and CR—Towards development of an alternative programme, we specifically asked subjects to make comparisons between TC and CR, or to reflect on CR experience they had. The gentleness of TC was repeatedly mentioned in our samples. For example, many agreed that our study advertising was attractive because the intervention was specifically highlighted as gentle; advertised as ‘Gentle Cardiac Rehab’. The ‘gentle’ aspect of TC exercise gave subjects the confidence that they would be able to participate. One subject even suggested that the programme could be started right after surgery (online supplementary table 1).

Subjects told us that TC (vs CR) increased their energy level. A few even suggested that TC may be a good first step to more activity, particularly when one is already very exhausted from cardiac surgery. Further, CR was perceived as stressful while TC reduced stress.

A TC programme was seen as more accessible for a number of reasons. Most subjects mentioned that they particularly appreciated that TC can be tailored, by the teacher or the participant, to different ability levels. This made TC both less frightening and more accessible.

Subjects said they disliked that in CR their success was determined by machines or readings from a treadmill; that is, they were held to an external marker of success. With TC, participants did not worry about ‘doing it right’. TC exercise allowed participants to do what they could and to feel empowered because they were able to participate. Subjects could create and meet their own goals.

Subjects reported a number of *physical* benefits from TC practice including improvements in balance and coordination. *Mental* benefits included improved mood, higher mental alertness and a better ability to keep calm in stressful situations. A number of individuals also mentioned that the practice was *empowering*.

Physical benefits: Many subjects reported improvements in physical activity, balance, coordination, strength, pain and range of motion.

Mental benefits: In the area of *mental benefits*, many subjects mentioned that TC was very effective in relieving stress and reactivity to stressors.

We also asked subjects about other health or behavioural changes such as changes in sleep. Participants did not report consistent changes in health behaviours such as sleep, although most reported moving more due to improved physical functioning.

Psychosocial benefits: All groups discussed that the practice was *empowering*, and one reason for this was that the instructors modified the TC poses for each participant so that anyone could safely participate. These aspects of personalisation and safety were noted many times.

Subjects reported they liked that the instructors fostered a positive atmosphere, which also encouraged self-efficacy.

Although we did ask the subjects for programme improvement ideas as part of the interview protocol, no negative accounts of the instructors were offered.

Another empowering aspect mentioned by many participants is that TC could be practised anywhere and could easily fit into one's everyday life.

One of the most common comments about the programme was the importance of the social support offered by group practice. Classmates provide support, care about each other, and this made the group practice class fun and interesting.

Barriers to TC programme and feedback on improvement

We asked subjects to tell us about any barriers to both individual practice at home and group practice. Online supplementary table 1 presents representative quotes from TC participants speaking of barriers to TC programme and feedback on improvement. Barriers to individual practice at home included difficulties in making time for doing the exercises and lack of familiarity with the TC moves, although the DVD provided for home practice was reported as helpful, particularly as it allowed the user to skip to a desired section of exercises. Group practice had the added barrier of requiring time to get to class, which was more challenging at certain times of day due to heavier traffic.

Given our goal of using participants' input to develop a better programme, we specifically asked subjects how we could improve the programme. Most participants reported that the class structure and schedule were excellent, and did not recommend any change in the number of TC sessions, time sessions were offered or duration of classes. A few mentioned specifically that the class was easier to get to when offered in the morning and this was due to lighter traffic patterns at this time of day. In asking about the barrier of time to practice, the topic of programme duration arose. All subjects commenting on the programme duration reported that they wanted the classes to continue. When considering a hypothetical range of doses, subjects wanted frequent classes.

Subjects' markers of personal training success

All groups spontaneously discussed their experiences of felt changes associated with TC practice such as increased self-efficacy and mindfulness. Some subjects spoke of these felt changes as benefits of TC and are included in the 'benefits' category above. Other reports appear to imply that these may be markers of personal training success or mechanisms of how TC might work (online supplementary table 1).

For example, some subjects hypothesised that TC might be effective because of the meditative practices taught in class. The instructions given in class to focus on the breath and on the movement itself with no expectations or worry about being successful promoted an attitude of tolerance towards limitations, non-striving and acceptance. This improved ability to look inward or be in the present moment without judgement fits well with a common working definition of *mindfulness*, or the cultivation of present moment experiential awareness.²⁷

A few subjects also mentioned improvements in self-efficacy, for example, improved movement efficacy and perhaps to avoid another cardiac event. Some subjects also report unexpected physical sensations during practice and changes in their overall outlook that they took as evidence of improvement. Such changes in focus and physical sensations are not adverse events, but are expected, and part of the classical understanding of TC's mechanisms.²⁸

DISCUSSION

The main goal of this pilot study was to evaluate an alternative approach to traditional CR. Research supported barriers to traditional CR participation include fear or dislike of exercise, lack of transportation, depression and high co-pays.^{29,30} We hypothesised that TC may overcome several key barriers to CR.¹⁰ as it can be practised safely by elderly and de-conditioned individuals; it is relatively gentle, non-threatening, and adherence and acceptance in prior studies has been good.¹⁰ We found our TC subjects reporting qualitative accounts of engagement, adherence, and positive physical and psychosocial responses. Such felt changes can enhance self-efficacy and long-term commitment—ultimately leading to reduced cardiovascular risk. Complementing our quantitative findings, this qualitative study supports the use of a TC programme as an excellent alternative to traditional cardiac rehabilitation.

This high-risk group of patients with cardiovascular disease reported that they enjoyed TC exercise, and felt confident and safe doing it. Participants also reported that TC practice supported other types of physical activity allowing for a generalisation of positive effects. This analysis also is consistent with published reports of Tai Chi practice improving mood and psychological well-being,^{29–31} stress reactivity,³² and physical strength and flexibility.^{33,34}

Participants appreciated the social aspect of the classes and an exercise model that empowered them to focus on current capabilities, rather than force them towards an external goal. Similar findings have been reported in other CR studies^{10,18,19} and in our sample are

associated with positive attitudes, improvements in exercise self-efficacy, mindfulness/attention and mood. All of these aspects overlap well with functional components of established theories of health behaviour change. As a behaviour change programme, our subjects told us that the social aspects of the programme helped in learning and adherence, ideas supportive of Albert Bandura's Social Learning Theory, and the experimentally validated observation that individuals learn from observing others' actions and the benefits of those actions.³⁵ We also found evidence that TC improved patients' self-efficacy or degree of confidence to perform a specific health behaviour.³⁶ Exercise self-efficacy is one of the strongest independent predictors of physical activity behaviour in heart failure.³⁷ As well, many of our subjects also told us that the programme focused on what they could do, rather than their illness. This establishment of a normative context of ability is an important functional part of a number of health behaviour theories such as Ellen Langer's work on Mindfulness and behaviour change³⁸ and the Theory of Reasoned Action.³⁹

Future work could consider prospectively how TC theory may overlap with other constructs of health behaviour change theory. For example, Social Cognitive Theory (SCT)⁴⁰ predicts that modulating an individual's outcome expectations can improve the likelihood of adherence to a healthier behaviour. Our subjects tell us that the TC class focused on what they were capable of; everyone was encouraged to do what they can. Some subjects reported that this helped them to move beyond a focus on their illness, and this may lead to an improvement in expectation. Perhaps too, the addition of mindfulness elements in TC, which encourage self-observation, allows the individual patient to use their own experiences more thoroughly through the hard-wired mechanisms of social learning. Future work could consider mindfulness and self-observation as process variables, along with other aspects of SCT such as goal setting, towards the development of more effective health behaviour change programmes.

This study used a small sample and a descriptive qualitative technique which limits our ability to generalise findings to larger populations. Also, we did not speak with people who did not participate in TC, thus the results only represent the experiences of study participants. However, this study has also a number of strengths. In particular, qualitative inquiry allows the emergence of new ideas that can be used in future studies. For example, without prompting, participants told us about components of the TC practice that experientially made it 'work' for them. Some of these mechanisms, such as changes in self-efficacy and the importance of social support, are supported by the TC literature.⁸⁹ Published work on the participant experiences of other mind-body techniques, such as yoga, reports similar support that self-compassion and mindfulness may also be mechanisms of change.¹¹¹² Moving forward, mind-body researchers will be able to communicate better, and learn with, the established behaviour change literature if we prospectively apply measurement to record changes in subjects' beliefs and behaviours, as predicted by health behaviour change theory models. Mind-body therapies will become more accessible to patients and practitioners as we better understand their mechanisms of action.

Mixing well with this prospective measurement approach, open-ended qualitative methodologies allow for the discovery of previously unrecognised experientially validated constructs. Such constructs are of value in programme development such as ours as they

offer the user's subjective viewpoint of the health benefits of traditional medicines. For example, our subjects told us that the TC programme allowed for the formation of warm social bonds. While this could be an expected aspect of any therapeutic group programme, are there aspects of TC that make it a more appropriate therapy for certain patients wishing to improve their health? In our case, a frequent reason for programme participation is the *gentle* aspect of TC, a usability factor for many subjects in our high-risk group. Understanding the patient's experience in this way can help us understand how to better apply behavioural medicine in a more personalised manner.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgements

We thank the study Tai Chi instructors Joe Anzalone, Jamee Culbertson, and Marie Favorito.

Funding This study was funded by National Institutes of Health grant NCCIH (R34AT007569). Dr. Yeh was supported by NIH NCCIH K24AT009465. Dr. Wayne was supported by NIH NCCIH K24 AT009282.

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