

**Stroke Survivors' Feelings and Perceptions of their Recovery after a Tai Chi Exercise
Intervention: A Qualitative Descriptive Study**

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Acknowledgments: This study was funded, in part, by an American Heart Association National Scientist Development Grant #0930324N (Taylor-Piliae, PI) and a Robert Wood Johnson Foundation Nurse Faculty Scholars Grant #66527 (Taylor-Piliae, PI). The funding sources did not participate in the study design, in the collection, analysis, and interpretation of data; in the writing of the report; or in the decision to submit the article for publication.

Disclosures: The authors have no financial disclosure or conflict of interest to report.

Text Word Count: 3, 761

Number of Tables: 1

Number of Figures: 0

ABSTRACT

Background: Most Tai Chi studies conducted among stroke survivors have focused on physical functioning, whereas inclusion of stroke survivors' feelings and perceptions of participating in Tai Chi is lacking.

Objective: Identify stroke survivors' feelings and perceptions of participating in a Tai Chi intervention during their post-stroke recovery.

Methods: This qualitative descriptive study examined stories from community-dwelling stroke survivors, collected as part of a larger randomized clinical trial. To examine these stories, an inductive content analysis approach was used with *a priori* theoretical codes (and sub-codes): 1.) Feelings (confidence, enjoy, hopeful, helpful, other), and 2.) Perceptions of Impact (physical abilities, mental/cognitive abilities, challenges, other). Lincoln and Guba's criteria were followed to ensure trustworthiness of the study findings.

Results: Participants (n=17) were on average 71 years old (range=54-87 years), mainly men (65%); and had the option of writing their own story or having someone write it for them. Stories from these stroke survivors revealed feelings of confidence (n=4), enjoyment (n=7), hope (n=1), and helpfulness (n=15). Perceptions of the impact of Tai Chi on their post-stroke recovery process identified improved physical abilities (n=23), better mental/cognitive abilities (n=12), moving forward (n=7) and developing friendships (n=4), with few challenges (n=1).

Conclusions: Using storytelling, healthcare providers can discuss the benefits of Tai Chi and then relate the feelings and perceptions of other stroke survivors' experiences to encourage engagement in regular physical activity to aid in the post-stroke recovery process.

Key words: exercise; narration; qualitative research; stroke rehabilitation; Tai Ji

BACKGROUND

Stroke affects more than 795,000 people every year in the United States (US).¹ It is predicted that by 2030, over 40% of adults in the US will have some form of cardiovascular disease, with stroke a leading cause of long-term disability.¹ Traditionally, stroke rehabilitation is limited to the first three to four months following a stroke. However, new empirical evidence indicates that physical activity and/or longer stroke rehabilitation is beneficial for stroke survivors several years after the incident event.^{2,3} On the other hand, lack of physical activity among stroke survivors can lead to partial recovery, recurrent strokes or depression; whereas regular physical activity can prevent falls, disability and loss of independence.^{1,4}

Despite the benefits of physical activity, stroke survivors often encounter physical (e.g., fatigue), emotional (e.g., social isolation) or environmental (e.g., transportation) barriers to regular physical activity participation.^{5,6} While many studies have focused on improving physical function and reducing disability post-stroke, there is a dearth of studies evaluating the experience of the recovery process from stroke survivors' perspective.³ In addition, understanding how to develop and encourage regular exercise participation among stroke survivors is not well understood. Boysen and colleagues⁷ found that healthcare providers who repeatedly advised stroke survivors to exercise, did not impact exercise participation, and this was especially true for women and the elderly. Additionally, there is very little data on which forms of exercise are most beneficial for stroke survivors, and there are still gaps in the research on innovative ways to promote regular exercise participation in stroke survivors.³

Tai Chi exercise, a form of martial arts, is known to improve health and well-being in older adults. Tai Chi is a branch of Traditional Chinese Medicine that has been practiced in China for more than 2500 years. Tai Chi involves slow meditative movements that connect

breath, mind and bodily movements to create balance, peace and harmony in a person's life.⁸ Tai Chi can improve balance, gait speed, strength, mood, alertness, and cognitive function, and has been found to be an enjoyable and suitable form of exercise for older adults, regardless of aerobic capacity or prior exercise experience.⁹⁻¹² Among stroke survivors, Tai Chi has led to significant improvements in balance, walking speed, and quality of life.¹³⁻¹⁵ Taylor-Piliae and colleagues found that stroke survivors who participated in a Tai Chi exercise intervention had significantly fewer falls, compared with those in usual care ($\chi^2=4.29$, $p=0.04$).¹⁶ Other reported benefits of Tai Chi among stroke survivors include better sleep, mood, and mental health.¹⁰ While Tai Chi is a safe and beneficial form of exercise for stroke survivors,¹⁷ no study has explored stroke survivors' feelings and perceptions of the impact of practicing Tai Chi exercise.

Theoretical Framework

Story Theory provided the framework to guide this study.¹⁸ Stories are a fundamental dimension of the human experience for making meaning. Story Theory posits that nurses and patients connect through stories in order to make sense of a situation and to alleviate discomfort.¹⁸ Stories are evolving processes that build as storytellers integrate stories into their lives. Story Theory has three assumptions. First, people change as they connect with their world in a boundless range of related layers. Second, people exist in the present and so they incorporate past and future events. Third, as stories evolve and as storytellers interact with other people, storytellers gain insight, significance, and a clearer understanding of their current or past experience.¹⁸ Storytelling has been used to promote healing and reduce discomfort among patients with cancer or diabetes,^{19,20} as well as to address bias in healthcare.²¹ Further, Story Theory has been used among Native American adolescents, allowing them to write about their experiences with stress and how they managed it.²² Hence, understanding the benefits and

challenges of participating in Tai Chi exercise from stroke survivors' perspectives is important for healthcare providers to investigate and may provide further insights into how to aid stroke survivors to engage in regular physical activity. In this study, the overall goal was to identify stroke survivors' feelings and perceptions of participating in a Tai Chi intervention during their post-stroke recovery, using storytelling. The study aims were to: 1.) identify and examine the stroke survivors' feelings about participating in a Tai Chi exercise intervention, and 2.) identify and examine stroke survivors' perceptions about how participating in a Tai Chi exercise intervention influenced their post-stroke recovery.

METHODS

Design

A qualitative descriptive approach was used, since this method aims to describe participants' experiences and perceptions of a phenomenon. The focus of qualitative descriptive methodology is the rich, straight description of an experience, with the interpretation of findings staying close to the data.²³ The qualitative descriptive approach allows the data to remain pure, while not over interpreting the data, and describes the meaning accurately in order to give voice to participants' experiences.

Participants

Community-dwelling stroke survivors in this qualitative descriptive study were part of the larger randomized clinical trial (RCT), the "Tai Chi Exercise for Stroke Survivors Study", a prospective RCT.¹⁶ Participants were recruited over 3 years (January 2009-January 2012) in cohorts of 12-15 stroke survivors and randomly assigned to Tai Chi exercise, SilverSneakers® exercise or Usual Care groups. A total of 145 stroke survivors (47% women, mean age=70±10

years, mean time post-stroke=3±4 years, ischemic stroke=66%, hemiparesis=73%) enrolled in the RCT. Approval to conduct the RCT was obtained from the Institutional Review Boards at the University of Arizona, HealthSouth and Carondelet Health Network in Tucson, AZ (approval #0800000257). The investigation was carried out according to the principles outlined in the Declaration of Helsinki, including written informed consent from all subjects.

At the end of the parent RCT, participants and their spouses or caregivers were invited to a presentation of the study results. During this time, the participants were invited to share their written story about participating in the Tai Chi Exercise for Stroke Survivors Study, in order to create a story bank for future research among stroke survivors. The principal investigator (RTP) invited all RCT participants in attendance from all study groups (n=120 estimate) to share their story. However, for this qualitative descriptive study, only the stories from those enrolled in the Tai Chi group were analyzed. Approval to conduct this qualitative descriptive study was obtained from the Institutional Review Board at the University of Arizona (approval #1701100809).

Data Collection

For this study, a “Tell Us Your Story” form with the following instructions were used: *“We are developing a Story Bank about how participating in “The Tai Chi Exercise for Stroke Survivors Study” has changed your life. We would like to use your story to encourage other stroke survivors to participate in future exercise studies or to begin a regular exercise program.”* The participants could either write their own story or have someone write it for them. Participants were given the option to write their story after the presentation on site, or complete it at home and mail it back to the study team using a self-addressed, stamped envelope.

Data Analysis

The written stories were analyzed using inductive content analysis with *a priori* theoretical codes and sub-codes, due to the lack of prior research of this topic. There were two theoretical codes: *feelings* and *perceptions of impact*. Feelings sub-codes were: confidence, enjoy, hope, helpful, and other. Perceptions of Impact sub-codes were: physical abilities, mental/cognitive abilities, challenges, and other. The data were first reviewed by one researcher (MZ) and imported into Atlas.ti for Mac®, with each story given a number. The data were separated into two categories based on the *a priori* theoretical codes to identify feelings and perceptions of impact. After the initial coding was completed, open coding was conducted to identify other sub-codes that appeared frequently in the documents. Two researchers (MZ and RTP) went through the data line by line, to ensure proper coding and to reach a consensus.

Trustworthiness of the findings was ensured using Lincoln and Guba's established criteria for evaluating qualitative research.²⁴ Credibility was established through the process of analysis triangulation, where multiple researchers review the data and reach consensus about codes and findings. Confirmability and transferability were established by creating an audit trail to record the step by step process of the data analysis, while the rich descriptions allowed other researchers to validate the research results. Dependability was ensured through external auditing of the data and preliminary results obtained from an outside researcher with cardiovascular disease and qualitative research expertise, but this person was not involved in the research process. The use of an external auditor who was not involved in the process of data collection is a strength but also can be interpreted as a limitation in qualitative research.

RESULTS

A total of 17 stories were collected from stroke survivors participating in the Tai Chi exercise intervention group, as a part of the parent RCT.¹⁶ These 17 community-dwelling stroke survivors were on average 71 ± 10 years old (range= 54 to 87 years old), and mainly men (n=11, 65%). Six of the participants (n = 6) had a research assistant or spouse/caregiver write their story for them due to convenience or physical limitations, thus some quotes are in third person. The average length of each story was 132 words, with the shortest story being 17 words and the longest was 364 words in length.

Feelings Associated with Participating in a Tai Chi Exercise Intervention

The a priori theoretical code of *feelings* included sub-codes of *confidence*, *enjoy*, *hope*, *helpful* and *other* (**Table 1**). Two participants used the word *confidence* four times. The two participants described how they had gained confidence in their body and their own ability; “*With the help of Tai Chi, she started to have more confidence in her body again and more confidence in what she could do, it gave her confidence to do things on her own again....it all started with Tai Chi*”, and “*he has proven to himself that he can do more than what he or his doctors thought he could, especially regaining confidence*”. Seven participants used the word *enjoy* in their story. The participants described how they enjoyed connecting with other participants, the activity and the instructor; “*Enjoyed every bit of the Tai Chi*”, and “*really enjoyed learning Tai Chi from the teacher in the study*”. One participant used the word *hope* in her story, by describing how Tai Chi “*made the world colorful again, infused with a sense of hopefulness*”. The most common feeling was *helpful* which was used 15 times by 11 participants. Tai Chi helped the stroke survivors both physically and mentally, and better balance and less falls were among the frequent cited reasons why Tai Chi had helped the participants; “*Helped most with fall prevention*”, and

“it helped me realize that I am different now and have learned to live with it”. During the data analysis, no ‘other’ feelings were discovered.

In summary, participants had very positive feelings’ regarding Tai Chi. Feelings play a key role in our lives. Recognizing and encouraging specific feelings can help healthcare providers design interventions and tools that help in stroke recovery. The impact of participants’ perceptions also plays a big role in recovery.

Perceptions of Impact: How Participating in a Tai Chi Exercise Intervention Influenced Post-Stroke Recovery

The a priori theoretical code of *perceptions of impact* described the stroke survivors’ perceptions of how participating in the Tai Chi exercise intervention influenced their post-stroke recovery. The a priori sub-codes were *physical abilities, mental/cognitive ability, challenges, and other* (**Table 1**). Improved physical ability was the most discussed topic within the stories. Sixteen of the participants reported perceived improvements in their physical ability, such as better balance, improved walking, fewer falls, better coordination and flexibility. Participants conveyed better balance: *“Stiffness on left side and terrible balance after the stroke were definitely improved during the Tai Chi classes”*, and *“Tai Chi helped me balance with turning quickly”*; and improved walking ability: *“It’s easier for me to walk...Tai Chi gave me more comfort in walking”* after participating in Tai Chi. Likewise, several participants reported fewer falls: *“Since being in Tai Chi she has really improved and doesn’t fall nearly as much as she did”*, as well as improved coordination: *“Tai Chi also improved coordination - stepping through a limited space and not stumbling”*. One participant reported better flexibility: *“increased flexibility in his hips and shoulders”*. Overall, Tai Chi had a positive impact on the stroke survivors’ post stroke recovery by improving their physical abilities.

For the sub-code of mental/cognitive ability, eight participants used words such as *attitude*, *mental ability* and *emotional well-being* to describe their perceived improved mental/cognitive ability from participating in the Tai Chi exercise intervention: “*The Tai Chi helped balance, my mind-set and my spirits*”, and “*she noticed improved cognitive reasoning and said she was able to think more clearly*”, as well as “*improved mental focus, not so liable to ‘zone out’ anymore.*” Only one participant mentioned how having other appointments or lack of transportation as a challenge for participating in the Tai Chi exercise intervention, and “*when I got home it was hard to practice on my own*”.

Through the data analysis, two “other” themes emerged that were not a part of the a priori theoretical sub-codes. The first “other” theme was *moving forward* where seven participants described how participating in the Tai Chi exercise intervention had helped them with living again and moving forward in their recovery and life. The stroke survivors made plans for traveling, moving and “*Will be volunteering with senior services*”. “*What I wanted to do with my life – tell stories - I can still do that and continue to grow*”. The second “other” theme was *friendship*. Four participants described how they “*gained a lot of friends*” by participating in the Tai Chi for Stroke Survivors Study. The participants reported how connecting with other participants helped both themselves and others in their post-stroke recovery process; “*he could pay it forward and help his recovery and become friends*”.

In summary, this study confirms that Tai Chi had a positive impact on stroke survivors’ physical and mental/cognitive abilities. These stories suggest that stroke survivors, in many cases, perceived that Tai Chi positively impacted their ability to move forward and plan for their future. Moving forward is important for anyone recovering from a major health crisis. Recognizing and understanding one’s new normal and still looking forward to the future is an

important component of a full recovery. The quotations from participants clearly illustrate recognition of their limitations, how to work through them, and plan for their future. Other participants reported that they were helping friends, gardening, and volunteering after participating in Tai Chi. Likewise, the importance of establishing connections and participating in group programs that help stroke survivors stay active in their community was reported.

DISCUSSION

When examining these stories, stroke survivors generally felt that participating in a Tai Chi intervention was helpful and enjoyable, and improved their confidence. Stroke survivors perceived that Tai Chi led to improved physical abilities, such as better balance and walking, along with fewer falls. Likewise, they perceived that their mental and cognitive abilities improved due to learning a sequence of Tai Chi movements. Finally, they perceived the impact of Tai Chi helped them to be more independent, move forward, develop friendships and make connections in their communities again.

Feelings

The stroke survivors in this study described positive feelings such as enjoy, confidence, hope, and helpful; that they experienced through participating in the Tai Chi exercise intervention. In this study, participants not only enjoyed learning and doing Tai Chi, but they also enjoyed connecting with other stroke survivors and the instructor during the classes. Enjoying an exercise such as Tai Chi, serves to reinforce continued exercise participation resulting in subsequent health benefits. While confidence is a feeling that can make the difference between incomplete and complete recovery, as confidence likely facilitates a firm commitment to the rehabilitation and subsequent recovery process. Our study findings are

similar to a recent study conducted by Hwang and colleagues among stroke survivors participating in a Tai Chi program.²⁵ Hwang and colleagues reported that the stroke survivors felt the Tai Chi program was enjoyable, and that it boosted their self-confidence and self-esteem.²⁵

Hope is an important coping strategy and psychological resource for patients with a chronic illness. This is especially important for stroke survivors, as they are exposed to many stressful situations such as limited physical ability, cognitive impairments, or financial burdens. The feeling of hope is important for stroke survivors to move forward in their recovery process, particularly among younger working age stroke survivors.²⁶ Alaszewski and Wilkinson²⁶ reported that younger stroke survivors (n=43, age range 30-59 years, 72% employed at stroke incidence) found hope to be deeply paradoxical, and an unwelcome distraction causing distress. This feeling of hope is in contrast to findings in our study, with different feelings of hope expressed. This is likely due to the differences in age and employment status of the study participants,²⁶ which is in contrast with participants in our study. While, only one participant used the a priori theoretical sub-code word of hope or hopefulness in their story, they expressed a positive feeling. In cross-sectional study,²⁷ among Tai Chi practitioners (n=20, age=53, 65% women), hope was found to be an important moderator between number of years of Tai Chi practice and perceived physical health.

The most frequently reported feeling in the participants' stories was helpful, and they felt that Tai Chi was helpful in their recovery and in their life. This finding is similar to other studies, where people report Tai Chi to be helpful and beneficial in their recovery process.²⁸ When a stroke survivor perceives that an intervention is helpful, he or she is more likely to adhere to the intervention and move forward in the recovery process.^{28,29} This feeling of help that was

expressed by these stroke survivors, confirms previously reported benefits of how Tai Chi has helped stroke survivors recover (e.g., physical function and quality of life).^{10,13,25,30}

Perceptions of Impact

Prior quantitative studies have documented physiological benefits gained by stroke survivors after practicing Tai Chi.^{13,15,16,30} Yet, this qualitative descriptive study had stroke survivors' share their own stories about the perceived impact Tai Chi had on their post-stroke recovery. The majority of stroke survivors perceived that Tai Chi led to improved physical abilities, better mental/cognitive abilities, had few challenges, provided the ability to move forward, and develop friendships. Our study findings are similar to recent studies among stroke survivors²⁵, adults at risk for stroke,³¹ and older adults with a chronic illness including stroke,³² that a Tai Chi program improved their physical function (e.g., better balance, strength, flexibility, and walking), increased their mental wellness, provided enjoyment, greater independence and social support.

Improvements in physical abilities, such as better balance and walking, along with fewer falls was the most frequent a priori sub-code observed in this study. These findings confirm the data collected in the parent RCT, that stroke survivors participating in the Tai Chi intervention group had significantly fewer falls and better aerobic endurance compared to the usual care group. In addition, Tai Chi participants in the RCT had significant improvements in physical function (i.e., balance, lower body strength and gait speed) post-intervention.¹⁶ Further, our findings support a recent meta-analysis that Tai Chi exercise among stroke survivors led to better physical function post-intervention.¹⁰ Likewise, the majority of stroke survivors in our study perceived that their mental/cognitive abilities improved, due to learning a sequence of Tai Chi movements. These findings confirm the data collected in the parent RCT, with significant

improvements in mental health reported by the Tai Chi participants post-intervention.¹⁶ Further, our finding supports prior quantitative research^{12,33} that Tai Chi led to better cognitive ability (e.g. executive function) among adults without stroke, post-intervention.

In this study, we used an a priori “other” sub-code for unexpected topics. Two unexpected topics of perceived impact were identified: moving forward and friendship. Participants’ perceived that they were able to move forward and make plans for the future, or volunteer in the community again. Further, several stroke survivors reported gaining friends, as a result of participating in Tai Chi. The findings of moving forward and friendship are similar to prior qualitative studies among stroke survivors or those at risk for stroke.^{25,31}

Study Limitations

The main study limitation was that the data collection method using written stories rather than semi-structured interviews, may have limited our ability to fully capture or adequately explore stroke survivors’ feelings and perceptions of the impact of participating in a Tai Chi intervention. However, given the group setting, written stories were deemed appropriate. In addition, by allowing some of these stories to be transcribed by a spouse, caregiver or the study staff, personal bias may have been inadvertently introduced. However, this method afforded the opportunity for stroke survivors’ with challenges due to hemiparesis and the lack of ability to write with their dominant hand, the opportunity to participate. While spouses/caregivers were not trained to write these stories, this was an appropriate means of data collection at the time, to allow all those interested in sharing their story to participate. Only 32% of the Tai Chi participants in the parent RCT volunteered, and may not fully represent the feelings and perceptions of all Tai Chi participants enrolled in the parent RCT. Finally, the instructions in the story collection form may have implied a positive response was expected leading to response

bias, as few participants reported negative feelings or perceptions of Tai Chi. Future studies should consider using semi-structured interviews or focus groups, to obtain longer and more descriptive statements that can be clarified or explored in depth, to gain a fuller understanding of the stroke survivors' feelings, perceptions and experiences of practicing Tai Chi during their recovery process, and recommendations for how to encourage future patients to participate in such a program.

CONCLUSION

In this qualitative descriptive study, stroke survivors' feelings and perceptions of participating in a Tai Chi intervention during their post-stroke recovery were discovered. The majority of stroke survivors felt that participating in a Tai Chi intervention was helpful and enjoyable, and some felt improved confidence. Further, they perceived the impact of Tai Chi on their post-stroke recovery led to improved physical abilities, such as better balance and walking, along with fewer falls. Likewise, stroke survivors perceived that their mental and cognitive abilities improved due to learning a sequence of Tai Chi movements. There were no perceived challenges. As well, they perceived the impact of Tai Chi helped them move forward in their lives and develop friendships. Using storytelling, healthcare providers can discuss the benefits of Tai Chi and then relate the feelings and perceptions of other stroke survivors' experiences to encourage engagement in regular physical activity to aid in the post-stroke recovery process.

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WHAT'S NEW?

- Storytelling can be used by healthcare providers to gain additional insights into stroke survivors' experiences during their recovery process.
- Stroke survivors described positive feelings of enjoy, confidence, hope, and helpful as a result of participating in a Tai Chi intervention.
- Perceptions of the impact of Tai Chi on stroke survivors' post-stroke recovery process revealed improved physical abilities, better mental/cognitive abilities, few challenges, the ability to move forward, and develop friendships.

Table 1: A Priori Theoretical Codes, Sub-codes and Representative Quotes

Theoretical Codes	Sub-codes (n=code frequency)	Representative Quote
Feelings	Confidence, n=4	<i>“She realized she had started to have more confidence in her body again and more confidence in what she could do.”</i>
	Enjoy, n=7	<i>“Enjoyed every bit of the Tai Chi. Great companions and enjoyed physical education.”</i>
	Hope, n=1	<i>“Being in Tai Chi made the world colorful again, infused with a sense of hopefulness.”</i>
	Helpful, n=15	<i>“My participation helped me to not be afraid, most important for survivors.”</i>
Perceptions of Impact	Physical Abilities	
	<i>Balance, n=10</i>	<i>“Stiffness on left side and terrible balance after the stroke were definitely improved during the Tai Chi classes.”</i>
	<i>Walking, n=7</i>	<i>“It’s easier for me to walk, and I walk for half an hour at the mall or in a park. Tai Chi gave me more comfort in walking.”</i>

<i>Falls, n=3</i>	<i>“Helped most with falls prevention. Since being in Tai Chi she has really improved and doesn't fall nearly as much as she did.”</i>
<i>Coordination, n=2</i>	<i>“Tai Chi also improved coordination - stepping through a limited space and not stumbling. Upper body coordination increased as well.”</i>
<i>Flexibility, n=1</i>	<i>“Everything he has gotten from Tai Chi has been a “plus: increased flexibility in his hips and shoulders.”</i>
<i>Mental/ Cognitive Abilities, n=12</i>	<i>“Improved mental focus, not so liable to ‘zone out’ anymore, improved memory to follow the Tai Chi movements.”</i>
<i>Challenges, n=1</i>	<i>“If I missed class due to appointment or lack of transportation, it was unavoidable. When I got home, it was hard to practice on own”</i>
<i>Other</i>	
<i>Moving Forward, n=8</i>	<i>“I'm excited about what may come with my health. What I wanted to do with my life - tell stories --I can still do that and continue to grow.”</i>
<i>Friendship, n=4</i>	<i>“Gained a lot of friends.”</i>